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Report on the Fifth Commonwealth Mycological Conference, 1954.—159 pp., Commonwealth Mycological Institute, Kew, Surrey, 1954. 15*s*. net.

Resolutions adopted by the Conference (pp. 11–12) [cf. *R.A.M.*, 28, pp. 508–509] recommend the continued maintenance of the quarantine greenhouse at Kew, but with revised methods of operation; the development of standard methods for rapid determination of seed-borne diseases, and surveys to discover suitable healthy areas for seed production; uniformity in recording plant disease losses; a review of facilities for rapid identification of bacterial pathogens; and the provision of increased facilities for training taxonomic mycologists.

Appendix I of the report (pp. 13–19) contains a review of the work of the Commonwealth Mycological Institute from 1948 to 1954 by the Director referring, *inter alia*, to the establishment of the Colonial Office Pool of Plant Pathologists.

Papers read and the ensuing discussions are contained in Appendix II (pp. 20–159). Dealing with plant disease legislation against seed-borne diseases (pp. 20–29) W. C. MOORE referred to the difficulties of existing seed certification as required between different countries and made suggestions for curtailing certification by improving administration and methods of seed testing. J. R. THOMPSON indicated the practical difficulties of adequately testing large quantities of seed for health in addition to purity and germination, and I. A. M. CRUIKSHANK, referring to the variable annual incidence of *Ascochyta* spp. on peas in New Zealand, suggested a zero tolerance level of infection as a basis for certification.

Discussing losses from plant disease in the Commonwealth (pp. 29–46), G. WATTS PADWICK instanced those affecting important crops in the Colonies, averaging a percentage total loss of 11·8, not inclusive of the cost of control measures and the total exclusion of some crops from certain areas. I. L. CONNERS described losses in Canada and E. E. CHAMBERLAIN gave figures of crop losses in New Zealand and of savings effected by control. R. S. VASUDEVA gave some instances of crop loss estimation in India and E. C. LARGE described methods of assessment in England and Wales with particular reference to *Phytophthora infestans* and *Actinomyces scabies* on potato.

Concerning cereal rusts and their control (pp. 46–58), R. H. CAMMACK gave an account of the spread of *Puccinia polysora* on maize in West Africa after its initial recognition in Sierra Leone in 1949, the ensuing discussion including reference to its subsequent simultaneous appearance in Rhodesia and various parts of East Africa. At present only one strain appears to be involved. Describing wheat rust in Canada, T. JOHNSON referred in particular to *Puccinia graminis* and the methods used for its control, including destruction of the alternate host, the possibilities of systemic chemical control, the restriction of wheat cultivation in certain areas which formed sources of inoculum, and the breeding of resistant varieties. R. S. VASUDEVA gave a general account of wheat rust in India.

Dealing with the eradication of established plant diseases (pp. 59–78), C. G. Hughes referred to the sugar-cane industry in Queensland where a formerly disease-ridden condition had been largely rectified by legislative as well as direct control measures and gave an account of the results obtained with specific diseases. C. J. Magee then dealt with the complete eradication of some plant diseases in Australia, and the marked degree of control obtained with others. He also read a paper by E. G. Baber concerning sugar-cane diseases in New South Wales. E. E. Chamberlain described the eradication of *Erwinia amylovora* from apples and pears, *Xanthomonas citri* from citrus, and *Ustilago hordei* and *U. tritici* from malting barley in New Zealand. A paper by R. E. D. Baker referred to a number of major diseases in the West Indies that had not been eradicated and gave reasons for this.

At the session on fungicides (pp. 78–106) A. J. Skolko discussed the use of antibiotics in plant disease control, R. S. Vasudeva described the anti-fungal substance produced by a strain of *Bacillus subtilis*, and E. E. Chamberlain gave an account of the use of antibiotics in the control of *Pseudomonas syringae* on stone fruits in New Zealand, referring also to the use of streptomycin against bean [*Phaseolus vulgaris*] halo blight (*Pseudomonas medicaginis* f.sp. *phaseolicola*). P. W. Brian dealt in detail with recent work on systemic fungicides and bactericides, indicating the need for further investigation. M. H. Moore spoke on low-volume spraying of apple trees against *Venturia inaequalis* and *Podosphaera leucotricha*, exemplified by experimental work at East Malling done in collaboration with the National Institute of Agricultural Engineering. A paper by C. A. Thorold described control of *Phytophthora palmivora* on cacao in Western Nigeria and one by P. Holliday dealt with the control of the same disease and also witches' broom (*Marasmius perniciosus*) in Trinidad.

In a series of miscellaneous papers C. R. Millikan (pp. 58–59) discussed the rapid identification of bacterial plant pathogens, G. R. Bates (pp. 106–111) dealt with tobacco disease problems in Southern Rhodesia, and R. A. Bull (pp. 111–116) and W. G. Kovachich (p. 117) described oil palm diseases in Nigeria and the Belgian Congo, respectively. E. Hainsworth (pp. 118–121) and A. Johnston (pp. 121–123) dealt with blister blight (*Exobasidium vexans*) of tea.

In the session on virus diseases (pp. 124–159) M. F. Welsh described stone fruit viruses in Canada and E. E. Chamberlain those of pip and stone fruits in New Zealand and their control. A. F. Posnette, discussing fruit viruses in Great Britain, dealt mainly with latent viruses and L. Broadbent described the etiology of *Brassica* virus diseases. A paper by J. T. Slykhuis dealt with the insect vector-virus relationship of wheat streak mosaic in Canada. E. E. Chamberlain described tristeza and other virus diseases of citrus in New Zealand, W. A. Hughes gave an account of lime die-back in the Gold Coast, and a paper by E. B. Martyn, describing citrus virus in the Gold Coast, compared die-back disease of limes there with that occurring in the West Indies. A. P. D. McClean gave a detailed account of virus infections in South African citrus, associated with the disease of stem-pitting and tristeza, and Lilian Fraser described stem-pitting in New South Wales. Papers by C. G. Hughes and N. C. King dealt with ratoon stunting disease of sugar-cane in Queensland and Natal respectively, and P. B. Hutchinson and W. L. Wise discussed some aspects of heat treatment of sugar-cane planting material.

Proceedings of the Seventh International Botanical Congress, Stockholm, 1950.—899 pp., 20 pl., Stockholm, Almquist & Wiksell; Waltham, Mass., U.S.A., The Chronica Botanica Company, 1953. [Received July, 1955.]

This publication [cf. *R.A.M.*, 16, p. 480] contains abstracts of papers read at the sectional meetings of the Seventh International Botanical Congress, held at Stockholm in 1950. Much of the information contained therein has already been noticed in this *Review*.

In the Agronomy section J. T. W. Montagne, Amsterdam, (pp. 204–205) speaking on soil fumigation for the control of plant diseases and conditions affecting the results, drew attention to the importance of the location of the parasite (surface-borne micro-organisms are not normally controlled by soil-injection of a volatile toxicant at a depth of 6 in.), its stage of growth, and the influence of water on fumigation.

M[olly] B. Hyde, Slough, England, (pp. 206–208) dealt with the occurrence and significance of subepidermal fungi in cereal grains [31, p. 177]. Combine-harvested wheat may possibly have less internal mycelium than that which is reaped and stooked. Germination was the same (98 to 100 per cent.) in normal, infected grain and artificially produced fungus-free grain. [M.] Bertha Moore, Harpenden, England, and M. Tveit, St. Paul, Minnesota, (p. 208) described the antibiotic action of *Chaetomium* sp. on organisms causing root rot of oats. The fungus, isolated from seed of Brazilian-grown oats, resembled *C. cochlioides* [34, p. 447].

In the section devoted to Experimental Ecology, P. W. Brian, P. J. Curtis, and E. G. Jefferys, Welwyn, England, (pp. 254–255) spoke on antibiotics produced by fungi isolated from acid heath soils [30, pp. 383, 531], stating that competition for nutrients, in which the saprophytes are more successful than root parasites, is often a major factor in microbiological antagonism. The production by many antagonistic saprophytes of antibiotics in laboratory culture suggests that their antagonistic effects in soil may be associated with this capacity, but there is as yet no conclusive evidence that these antibiotics can be produced in the soil. Erna Grossbard, London, (pp. 255–256) dealt with the production of antibiotic substances in the soil [30, p. 139; 32, p. 140]. The microbial competition in partially sterilized soil inoculated with five fungi known to produce antibiotics in culture did not as a rule interfere with antibiotic formation. It is suggested that manuring even non-sterile soil with sources of carbohydrate may induce not only a change in the microflora but also the formation of toxins of microbial origin. The addition of glucose to non-sterile soil may give rise to antibiotic activity and the available evidence indicates that there is a similarity in requirements for antibiotic formation in the soil *in vitro* and in treatments which control certain root diseases.

In the Forest Botany section G. F. Gravatt, Beltsville, Maryland, (pp. 294–295) presented a paper on the problem of the world-wide spread of forest diseases [cf. 29, p. 65; 33, p. 508; 34, p. 759], pointing out that five major introduced diseases now established in the United States will ultimately affect forest production and species composition on perhaps 170 million acres. In the discussion that followed his paper on virus diseases of forest trees (pp. 295–296) L. Hutchins, Beltsville, Maryland, said that little leaf of *Pinus echinata* [31, p. 360] had not been transmitted by graft inoculations, described the symptoms of zonate canker of elms [30, p. 294], and stated that phony peach virus is transmissible only by grafting [33, p. 488]. N. F. Buchwald, Copenhagen, (pp. 296–297) dealing with *Pseudotsuga* [*taxifolia*] and *Phaeocryptopus gaeumanni* in Denmark [18, p. 826], stated that by 1948 seventy localities had become affected, the evidence indicating that during the hard, dry winter of 1946–7 only infected needles were shed [32, p. 410], death being probably due to desiccation rather than cold. Mildred K. Nobles, Ottawa, (pp. 297–298) speaking of the cultural identification of fungi causing decay in coniferous trees of British Columbia, stated that identifications are made by comparing the characters presented on malt agar and on malt agar plus gallic or tannic acid with those of named cultures grown under the same conditions, using a numerical key. In the discussion that followed the paper by H. Zycha, Münden, Hanover, (pp. 298–299) on bark necrosis of beech [31, p. 91] W. P. K. Findlay stated that a similar disease occurs in England, especially on steep chalk hills with thin

soil. F. L. Howard and J. G. Horsfall, Kingston, Rhode Island, (pp. 299–300) discussed concepts and progress in plant chemotherapy [31, p. 133] with particular reference to wilts.

W. Bavendamm, Reinbek-Hamburg, (pp. 314–315) outlined the possibilities of artificial culture of lignicolous and humicolous edible fungi for the production of protein and drugs [cf. 30, p. 89]. W. P. K. Findlay and J. G. Savory, Princes Risborough, England, (pp. 315–316) dealt with the breakdown of timber in water-cooling towers [34, p. 561] caused by fungi attacking the central layers of the secondary walls of the wood elements. Methods of isolation were described and the fungi found listed. These are apparently secondary and follow partial decay caused by wood-destroying basidiomycetes [34, pp. 415, 562] or partial hydrolysis due to water, heat, or chemicals. E. Rennerfelt, Stockholm, (pp. 316–317) speaking on heartwood constituents in some conifers and their fungicidal properties, stated that characteristic components of *Pinus* heartwood are pinosylvin and pinosylvin monomethyl ether [35, p. 58]. Experiments showed the outer heartwood of pine to be generally more resistant to decay than the inner.

Helene Francke-Grosmann, Reinbek-Hamburg, (pp. 317–318) discussing the ecology and taxonomy of *Ophiostoma* [*Ceratocystis*] *ips* [32, pp. 454, 654; 33, p. 394], believed that a subdivision of the genus *sensu* Nannfeldt [11, p. 606], at least into species with (*a*) fasciculate and (*b*) irregularly disposed asci, would be inevitable once a closer study of the fructifications is undertaken.

Aino Mathiesen [-Kääriк], Stockholm, (pp. 318–319) summarizing information on the blueing fungi associated with bark beetles in Sweden [33, p. 394], mentioned two new concomitants of Cerambycidae, viz., *Ophiostoma olivacea* n.sp. occupying the galleries of *Acanthocinos aedilis* and *O. tetropii* n.sp. living in symbiosis with *Tetropium* sp.

D. V. Baxter, Ann Arbor, Michigan, (pp. 319–321) dealing with the relation of cultural practices to disease in American forest plantations, stated that in three of the oldest (established between 1890 and 1911) early evidence of butt and root rot points to sources of much loss in stands planted on similar sites in the future. Most of the plantations are not old enough to be seriously affected by stem or top rots. Decay in the extensive plantations of *Pinus divaricata* in the Nebraska National Forest has followed sun-scald and pruning injuries. Certain rust fungi have become a serious obstacle to the successful growth of plantation pine. Small units planted with suitable species are the most advisable. J. S. Boyce, New Haven, Connecticut, speaking on the development of tree diseases in the United States (pp. 321–322), said that pathology of forest trees had primarily to concern itself with losses caused by decay in immense stands of over-mature timber. More than one-fourth of the saw-timber in the United States is Douglas fir (*Pseudotsuga taxifolia*). In western Oregon and Washington it averages 15 per cent. loss from decay, rising to 50 per cent. or more mainly due to *Fomes pini* [34, p. 499] in individual stands. In the east, with the removal of nearly all the virgin timber, diseases of younger stands have become important, and *F. annosus* is causing increasing injury to conifers outside their natural range or in stands of unnatural site and composition. A new type of disease is apparently caused by changes in forest conditions brought about by man, e.g. little leaf of certain southern pines [32, p. 42], die-back of birch [loc. cit.], and pole blight of western white pine [*Pinus monticola*: loc. cit.]. A. J. Riker, T. F. Kouba, W. H. Brenner, and R. F. Patton, Madison, Wisconsin, (pp. 322–323) dealt with white pine trees selected for resistance to white-pine blister rust (*Cronartium ribicola*). In 1938 and 1939 about 150 *P. strobus* trees which had withstood natural infection from wild *Ribes* in the vicinity for over 15 years were selected, the open-pollinated seed collected, and veneer grafts made from each. Over 1,000 grafts and 10,000 seedlings were planted. After heavy, artificial inoculation, over 99 per cent. of the commercial seedlings died in three years. On the other hand natural

infection caused few grafted trees to become diseased, but in seven years 71 per cent. of the commercial seedlings were affected. Among the open-pollinated progeny of the most resistant trees, however, survival was significantly better than among the controls.

In the Mycology and Bacteriology section W. H. Schopfer, Bern, (pp. 388–389) explained the significance of vitamins in the nutrition of *Phycomyces blakesleeanus* and *Neurospora crassa* [cf. 15, p. 169; 17, p. 247; 20, p. 129, *et passim*]. An analytical study of chemotropism in the Saprolegniaceae, represented by *Saprolegnia ferax* [cf. 25, p. 13; 31, p. 621; 32, pp. 205, 438], was described by F. G. Fischer and G. Werner, Würzburg, (pp. 389–390). J. Magrou, H. Marneffe, and F. Mariat, Paris, (pp. 390–391) described the morphogenic action of vitamins upon certain fungi, stating that *Sphaerocybe concentrica* produced characteristic coremia only in the presence of aneurin, the minimum concentration required being 4×10^{-9}. A. A. Bitancourt and Victoria Rossetti, São Paulo, Brazil, (pp. 391–392) spoke on the role of thiamin in the nutrition of *Phytophthora* spp. [cf. 23, p. 453; 25, p. 133], further work with *P. citrophthora* indicating that thiamin does not directly induce the ramification of the mycelium but controls some prior condition, such as the division of the nuclei. N. Fries, Uppsala, (pp. 392–393) dealing with intermediates in the biosynthesis of purines in fungi, described investigations with *Ophiostoma multiannulatum* in which a method was devised permitting a selective isolation of guanine-less mutants [30, p. 339; 32, p. 498]. It is thus possible that new biochemical types may be found, throwing more light on the formation of guanine.

L. E. Wehmeyer, Ann Arbor, Michigan, (pp. 393–394) dealt with methods of approach to the taxonomic study of the fungi. In the discussion that followed, I. Reichert drew attention to the danger of using the name of the ascigerous stage in nomenclatural practice and discarding the conidial name. K. Cejp, Prague, made proposals for characterizing the taxonomic units of Fungi Imperfecti (pp. 395–396), five new classification units being suggested for the Deuteromycetes: cumulus, subcumulus, pseudofamilia, cohors, and subcohors. A. Munk, Silkeborg, Denmark, (pp. 396–397) dealt with relations between stromatic and non-stromatic Pyrenomycetes. He regarded the presence or absence of a 'stroma' as a character of minor importance from the morphological point of view and proposed certain taxonomic amendments accordingly. A. J. Mix, Laurence, Kansas, (pp. 397–398) described studies in the genus *Taphrina* with reference to the behaviour of various species as to the utilization of nitrogen compounds, 13 species of *Torulopsis* also being studied [25, p. 235; 33, p. 384]; the results are summarized in tabular form. V. Scardovi, Bologna, (pp. 398–399) presented some remarks on the life-cycle of the Torulopsidoideae [21, p. 44], pointing out that the relationships between the non-spore-forming yeasts and the Ascomycetes are not clear and the systematic position of the former very uncertain. One strain of *Torulopsis* has been submitted to a first series of cytological investigations which revealed the complexity of the life-cycle of the non-spore-forming yeasts, and if it be assumed that cells in fusion are [h]aploid, then the process resembles 'holobasidium' formation.

R. Singer, Tucumán, Argentina, (pp. 401–402) dealt with the antibiotic activity and formation of ectotrophic mycorrhiza in relation to natural affinity in the classification of the Basidiomycetes [33, p. 365]. The genera and species tested for antibiotic activity were arranged in Saccardo's order of classification and then in a parallel list according to the author's [31, p. 147]. The latter shows a relationship between the taxonomic position of the fungus and the bacteriostatic action of the fungus extracts. Similar lists were compared for fungi forming ectotrophic mycorrhiza with forest trees, with essentially the same result. On the other hand, many genera and entire families (the Gomphidiaceae and the Rhodophyllaceae) appear to be devoid of antibacterial activity. A marked parallelism was established between

such absence and the presence of mycorrhiza relationships in several groups of Basidiomycetes.

R. Falck, Atlanta, Georgia, (pp. 402–406) gave an exposition of the function of the degobasidium in relation to his life-cycle system of the filamentous fungi [28, p. 249], supplemented by lists of the sections and classes of the Degobasidiales. R. Kühner, Lyons, presented a paper (p. 407) on some microscopic characters of the mycelia and germination of the Agaricales of which use can be made in systematy [cf. 29, p. 436; 33, p. 757]. He considered that a subdivision of the Agaricales according to the colour of the spores is to a large extent justifiable and stressed the importance of the number of nuclei in the terminal segments of growing hyphae.

R. Emerson, Berkeley, California, (pp. 412–413) dealt with experimental investigations of the physiology, cytogenetics, and cytotaxonomy of the Blastocladiales [cf. 30, p. 290]. Hilda M. Canter-Lund, Ambleside, England, (p. 413) described researches on planktonic phycomycetes [30, p. 434] and stated that up to 71 per cent. of the common plankton algae species in Windermere may be infected by fungi during one or more periods of the year. The parasites so far found on the zooplankton all belonged to the Biflagellatae. Grace M. Waterhouse, Kew, England, (pp. 413–414) described the identification of *Phytophthora* species by means of oospores produced in dual cultures [cf. 34, p. 100]. Oospores of water moulds were obtained rapidly by culturing the mould with known *Phytophthora* species, thus making it possible to identify water moulds vegetatively resembling *P. cryptogea* by growing each one with *P. cinnamomi*. The evidence indicates that all species of *Phytophthora* are basically hermaphroditic; if two strains are essential to produce oospores, it is because biochemical stimulation is necessary and not that the species is heterothallic. Mina Nadel-Schiffmann, Rehovot, Israel, (pp. 414–415) dealt with the influence of temperature and rainfall on the appearance of different species of *Phytophthora* causing rotting of citrus fruits [31, p. 604]. M. T. Cook, Baton Rouge, Louisiana, (p. 415) described the distribution of species of the genus *Synchytrium* in North America [33, p. 118]. J. T. Middleton, Riverside, California, (pp. 415–416) dealing with the Peronosporaceae of the Colorado Desert of California, U.S.A., listed ten species of *Peronospora* and one of *Plasmopara* collected in the winter of 1940–1 and discussed their occurrence in relation to rainfall conditions.

Ö. Winge, Copenhagen, (p. 424) reported studies on the polymeric genes for maltose fermentation in yeasts, and their mutability [cf. 28, p. 320]. The experimental studies of R. Bauch, Greifswald, (pp. 425–426) on the development of giant cells in brewery yeasts and other fungi [20, p. 548] are summarized, with 20 references to the relevant literature. E. C. Stakman, St. Paul, Minnesota, (pp. 428–430) described mutation and hybridization in the smut fungi [cf. 28, pp. 229, 233]. J. W. Groves, Ottawa, Canada, (p. 433) reported studies on sexuality and heterothallism in the Sclerotiniaceae, in which two outbreeding mechanisms have, confusingly, both been called heterothallism.

E. Melin, Uppsala, (pp. 435–436) described recent studies in Sweden on the nature of tree mycorrhiza [cf. 28, p. 189; 32, p. 268; 34, p. 666] with special reference to nutrition, radio-active phosphorus being transferred to pine seedlings by mycorrhizal hyphae. Other evidence indicated that the intensity of branching of tree mycorrhiza may depend on the rate of auxin production of their fungal components. B. Peyronel, Turin, Italy, (pp. 436–438) dealt with the study of mycorrhiza by direct observation, either macroscopically *in situ* or microscopically on the living plant, avoiding interference with the mycelial threads connecting the mycorrhiza with the soil [cf. 17, p. 263; 25, p. 310]. D. T. MacDougal and J. Dufrénoy, San Francisco, (pp. 438–439) reported the results of studies on the mycorrhiza of excised roots of the Monterey pine (*Pinus radiata*) [25, p. 411];

rootlets severed from the parent tree but left in the forest litter retain their connexion with the fungi sharing the mycorrhizal relationship, and continue to grow indefinitely. Cytological evidence is presented showing that they not only satisfy their carbon and nitrogen metabolic requirements, but even store surplus carbohydrates and proteins. E. Björkman, Stockholm, (p. 439) described experiments leading to a new theory of the formation of ectotrophic mycorrhiza [23, p. 270]. Mycorrhiza grow best in strong light (over 25 per cent. of full daylight) and with a certain deficiency of readily available nitrogen or phosphorus, and develop characteristically if the host roots contain a surplus of soluble carbohydrates.

S. A. Waksman, New Brunswick, New Jersey, (pp. 440–447) dealt with antibiotics and their significance in the physiology of micro-organisms [31, p. 395; 32, pp. 590, 687; 33, p. 104], the main points discussed being the antibiotic concept, antibiotics and the survival of micro-organisms, the formation of antibiotics, their destruction, inactivation, and adsorption, and their mode of action. H. Tamiya, Tokyo, (p. 447) described some new approaches to the problem of the mode of action of antibacterial substances, investigating their influence on the course of the logarithmic growth curve of bacteria, and using *Staphylococcus aureus* and *Escherichia coli* as test organisms. P. W. Brian and J. M. Wright, Welwyn, England, (pp. 447–448) reported studies on alternaric acid [cf. 34, p. 312], an antifungal and phytotoxic metabolic product of *Alternaria solani* [32, p. 517]. The substance is anti-fungal but not anti-bacterial, and its activity is somewhat specific. Its toxic effect is not specific, however, to solanaceous plants, so the host range of *A. solani* must be determined by other factors. E. G. Jefferys, Welwyn, England, (pp. 448–449) described researches on antibiotics in soil ecology, in which those produced by moulds isolated from soil were tested for their stability [32, p. 440; 33, p. 369]. J. G. Brown, Tucson, Arizona, (p. 449) briefly indicated the results of experiments with antibiotics in relation to bacterial diseases of plants [26, p. 18]. D. Gottlieb and P. Siminoff, Urbana, Illinois, (pp. 449–450) reported the results of investigations into the activity of antibiotics in soil [cf. 32, p. 393]. Johanna C. Sobels, Utrecht, Holland, (pp. 450–451) described studies on the culture and antibiotic properties of Myxomycetes [30, p. 280].

Agathe L. Van Beverwijk and Joha[nna] Westerdijk, Baarn, Holland, (pp. 451–452) gave a survey of the development and aims of the Collection of the Centraal-bureau voor Schimmelcultures [cf. 26, p. 498]. The collection, which is constantly growing, now contains 7,600 strains and species; in 1949, 2,600 cultures were distributed to 33 different countries, and 430 identifications were made.

O. Roberts, Cork, Eire, (pp. 453–454) gave the results of studies on translocation in the fungi in which the uptake and translocation of sugar and minerals was investigated in a number of moulds by observing their growth from a full nutrient agar on to a contiguous agar deficient in one or more nutrients. In the agarics, rapid upward translocation of fluorescein solution at rates up to 2 in. per hour was observed in definite zones of the stipe. Possibly such movement takes place by means of a mechanism similar to that in the phloem of higher plants. Erna Bach, Copenhagen, (p. 454) described experiments on hydrocyanic acid formation in *Pholiota aurea* indicating that it is an enzymatic reaction which, if not directly produced by oxidative decomposition, is coupled to oxidative reactions. Birgitta Norkrans, Uppsala, (pp. 454–455) reported studies on cellulolytic enzymes of different *Tricholoma* species conducted by the photometrical method [cf. 30, p. 484], in which mycorrhiza-forming and non-mycorrhiza-forming *Tricholoma* species and two wood-destroyers, *Polyporus* [*Fomes*] *annosus* and *Coniophora puteana*, were compared as to enzyme activity in relation to mycelial total nitrogen formed. G. Lindeberg, Uppsala, (p. 455) described different types of phenol oxidases in the cultivated mushroom [cf. 32, p. 224]. Rhizomorphs of *Psalliota bispora* were proved to contain phenol oxidases of two kinds, viz. a laccase and a carbon monoxide-

sensitive polyphenol oxidase of the tyrosinase type. The fruit bodies ultimately contained only tyrosinase. Information on the microbiology of fresh and salt water sediments was presented by W. SCHWARTZ, Mahlum bei Bockenheim, Western Germany, (pp. 455–456).

In the section on Nomenclature the Report of the Special Committee for Fungi as accepted by the Congress (pp. 549–550), forming Supplement IV to the Report on Nomenclature, covered the recommendations accepted on the various Articles.

In the Phytopathology section HELENA [L. G.] DE BRUYN, Wageningen, Holland, (pp. 695–697) described studies on the adaptation of *Phytophthora infestans* to various potato hybrids [32, p. 206]: races of the fungus may possibly exist, but if so, they must be distinguished by characters other than those used hitherto. W. A. F. HAGBORG, Winnipeg, (p. 697) reporting investigations into the adaptation of *Xanthomonas translucens* to different host plants, stated that several *formae speciales* occur in this species. They have many attributes in common, but differ in their adaptation to different hosts. Future studies will probably show that many bacterial phytopathogens at present known under species names should be classified as *formae speciales*. G. M. ARMSTRONG and J[OANNE] K. ARMSTRONG, Clemson, South Carolina, (pp. 697–698) recorded results obtained in a comparison of the host relationships of the American, Indian, and Egyptian cotton wilt-inducing species of *Fusarium* [28, p. 189; cf. 31, pp. 19, 362; 33, p. 539; 34, p. 37]; the inadequacies of the existing systems of classifying these fungi are indicated. N. T. FLENTJE, London, (p. 698) dealing with specialization and variation in *Rhizoctonia* [*Corticium*] *solani*, stated that the reaction of various plants to different isolates of the fungus ranges from high susceptibility (progressive damping-off) to complete insensitivity. When *C. solani* meets a host to which it is not pathogenic, the hyphae merely grow round the obstacle; when, however, it causes damping-off, they grow towards the hypocotyl, adhere firmly to it, and form an 'infection cushion'. There is also a contrast between progressive and arrested invasion.

K. O. MÜLLER, Cambridge, (pp. 699–700) discussed the hypersensitivity reaction of the potato to *Phytophthora infestans* from a genetical and phytopathological point of view [cf. 30, p. 625; 31, p. 454; 32, p. 446], summarizing investigations into the morphological and physiological changes through which the infected tissues of the different host genotypes pass under the influence of the fungus. A. J. [P.] OORT, Wageningen, (pp. 700–701) reported the results of researches on the hypersensitivity of wheat to loose smut (*Ustilago tritici*) [25, p. 160; 26, p. 445]. In most cases the hypersensitive host dies together with the parasite before the latter can produce spores. R. BAUER, Voldagsen-Elze, Western Germany, (p. 701) reported the results of inoculation experiments to determine the reactions of *Ribes* spp. to *Sphaerotheca mors-uvae* [33, p. 163], in which only two species remained free from infection, viz., *R. divaricatum* and *R. niveum*. G. VIENNOT-BOURGIN, Paris, (pp. 701–702) described his morphological study of some smut lesions of plants (*Ustilago* spp.) [31, p. 503].

E. C. STAKMAN, St. Paul, Minnesota, (pp. 702–704) dealt with variation in plant pathogenic fungi and its practical importance. A study of 7,500 biotypes in *Ustilago maydis*, all derived as mutants or recombinations from two original sporidia, showed some to be extremely mutable while others are relatively stable. G. W. KEITT, Madison, Wisconsin, (p. 704) reported the results of studies on the inheritance of pathogenicity in *Venturia inaequalis* [34, p. 231].

D. J. WATSON, Rothamsted, (pp. 704–705) described experiments on the effects of infection with beet yellows virus on the growth and carbohydrate metabolism of sugar beet [31, p. 217; 33, pp. 130, 653]. F. C. BAWDEN, Harpenden, England, (pp. 705–706) described some properties of tobacco necrosis viruses [33, p. 725], including the Rothamsted culture [30, p. 126]. C. H. CADMAN and R. V. HARRIS, East Malling, England, (pp. 706–707) reported recent advances in research on raspberry

virus diseases with special reference to the analysis of the virus complexes causing economic diseases of raspberry in Great Britain [33, p. 736]. An expanded version of the contribution of E. Köhler, Celle, Western Germany, (pp. 708–709) to the premunity problem in connexion with tobacco mosaic virus has already been noticed from another source [34, p. 701]. A. Rozendaal, T. H. Thung, and J. P. H. van der Want, Wageningen, (pp. 709–710) reviewed the results of researches in Holland and elsewhere on soil-borne virus diseases, including potato spraing and stem mottle and tobacco rattle [32, p. 145], stipple streak of bean [*Phaseolus vulgaris*] and a necrotic disease of tulips, both belonging to the tobacco necrosis group [28, pp. 85, 645; 29, p. 215], and carnation mosaic [31, p. 123]. In a further paper (pp. 710–712) the same authors described their experiments on curing virus diseases, including potato leaf roll, by heat [32, p. 387; 34, p. 132]. L. J. Klotz, Riverside, California, (pp. 712–715) dealt with virus diseases of citrus, including psorosis of oranges [30, p. 34], 'stubborn', 'acorn', or 'little leaf' disease of orange and grapefruit [30, p. 104], and the group of diseases that includes stem-pitting of grapefruit [34, p. 640], tristeza [31, p. 62], and virus disease of limes in the Gold Coast [33, p. 157 and above p. 82].

P. Nobécourt, Grenoble, France, (p. 715) discussed tissue cultures and phytopathology with special reference to the study of immunity [7, p. 338] and of 'plant cancers' and neoplasms [cf. 34, p. 774]. A. J. Riker and A. C. Hildebrandt, Madison, Wisconsin, (pp. 715–716) recorded the results of *in vitro* studies on the stimulation or inhibition by basic nutrients of diseased plant tissue growth due to *Agrobacterium tumefaciens* [loc. cit.]. P. Manigault, Paris, (p. 716) described the histochemical reactions of *Pelargonium zonale* during the development of experimental tumours induced by *A. tumefaciens* [33, p. 284]. W. A. F. Hagborg, Winnipeg, (pp. 716–717) proposed a motion for the international standardization of technical words in plant pathology, suggesting that a committee be named to deal with the matter and report to the next Congress, which proposal was approved.

Marion A. Watson, Rothamsted, England, (pp. 717–718) discussed various hypotheses that have been put forward to account for the behaviour of persistent and non-persistent aphid-transmitted viruses [25, p. 245; 34, p. 207]. K. Silberschmidt, São Paulo, Brazil, (pp. 718–719) described work on the experimental and spontaneous transmission of 'infectious chlorosis' of Malvaceae [27, p. 553]. K. Stapp, Brunswick, (p. 719) discussed the status and significance of the serological method for the detection of potato viruses in Germany, with special reference to virus X [31, p. 453]. J. G. Bald, Los Angeles, (p. 720) dealt with the development of plant viruses in host cells, outlining an hypothesis of the association between virus and cell. Helen P. Beale and J. H. Beale, Yonkers, New York, (p. 721) described a virus ring spot disease of lilac observed near Yonkers in 1949 [32, p. 380]. J. Caldwell, Exeter, England, (p. 721) reviewed some aspects of seed transmission of virus, emphasizing that this should be considered as transmission in the seedling, and not in the testa or on the surface of the seed.

Recent studies by G. Gassner, Brunswick, (pp. 721–723) on the control of wheat and barley loose smuts [*Ustilago tritici* and *U. nuda*] by moistening the seed with (instead of immersing in) hot water [29, p. 612] were described. W. H. Burkholder, Ithaca, New York, (pp. 723–724) described studies on certain bacteria that cause rots in tubers and bulbs in New York State, particularly *Pseudomonas cepacia* and *P. alliicola* [29, pp. 489–490], attacking onion bulbs when topped, and *Erwinia atroseptica* and *E. carotovora*, which, with various species of *Bacillus*, commonly cause soft rots in potato tubers [29, p. 276]. J. T. Middleton, Riverside, California, (pp. 724–725) reported the results of studies on *Pythium* root rot of Leguminosae. Several species of *Pythium* cause such rots in the United States. Inoculation experiments showed there to be two types of rotting; in one the fungus was aggressive only when conditions favoured the pathogen and not the plant, and

in the other it caused some rotting at all the temperatures employed. These root rots may often be controlled by planting when soil temperature is optimum for plant growth. GERMAINE DEBRAUX, Poitiers, France, (pp. 725–726) described studies on the chemotherapy of vine [downy] mildew (*Plasmopara viticola*) by means of organic compounds [27, p. 407]. MINA NADEL-SCHIFFMANN, Rehovot, Israel, (p. 726) presented a contribution on *Penicillium digitatum* and *P. italicum* on citrus fruits [33, p. 347], dealing with differences in their pathogenicity and the influence of ecological factors upon incidence of infection.

E. VAN SLOGTEREN, Lisse, Netherlands, (pp. 727–728) discussed the incidence of plant diseases with reference to the great increase in the number of those identified that has taken place in the last 50 years, and to the probable effects of international co-operation in crop production and research. P. H. GREGORY, Rothamsted, England, (p. 728) dealt with the factors controlling plant disease gradients and the lessening incidence with increasing distance from the source, a knowledge of which is fundamental to the control of crop diseases by isolation [28, p. 303; 29, p. 348; 33, p. 544; 34, p. 664]. MARY D. GLYNNE, Rothamsted, (pp. 728–729) discussed the factors affecting the incidence of eyespot (*Cercosporella herpotrichoides*) on cereals [31, p. 279; 33, pp. 76, 409] with reference to crop rotation, the application of nitrogenous fertilizers, rate of seeding, and spraying with sulphuric acid. R. HULL, Harpenden, (pp. 729–739) discussed some factors affecting the incidence of yellows virus in sugar beet in Great Britain [34, p. 693]. I. REICHERT, Rehovot, Israel, (pp. 730–731) discussed a biogeographical approach to phytopathology. T. H. THUNG, Wageningen, (pp. 731–732) presented the Report of the Committee on the Classification and Nomenclature of Plant Viruses [35, p. 76].

SALZMANN (R.). **Tätigkeitsbericht der Eidg. Landwirtschaftlichen Versuchsanstalt Zürich-Oerlikon über das Jahr 1954.** [Report on the work of the Federal Agricultural Experiment Station Zürich-Oerlikon for the year 1954.]—*Annu. agric. Suisse*, (56), N.S., 4, 5, pp. 383–446, 3 figs., 1955.

The following information of phytopathological interest occurs in this report [cf. *R.A.M.*, 34, p. 210]. Haulm-killing with chemical sprays for the control of [unspecified] potato viroses is widely practised in central Switzerland [34, p. 537] and the popularity of the method is increasing year by year. In the area under the supervision of the German-Swiss Seed Potato Associations the average incidence of severe virus infection in 402 certified plots of class A (1953 harvest) was 3·6 per cent. as compared with 7·2 in 373 plots of 1952, the corresponding figures for 1,539 and 1,708 class B plots of the same two harvests being 10·8 and 25·1, respectively. As in the previous year, the Saskia and Jacobi varieties sustained the least damage from these diseases.

The results of an experiment to determine the relative efficiency of early and late roguing in the control of potato leaf roll virus on the Bintje variety confirmed the general opinion as to the extreme importance of timely elimination of diseased plants. Thus, the percentages of infection on 12th, 19th, and 27th July in the early-rogued stands were 0, 5·4, and 59·5, respectively, in those rogued 10 days later 8·1, 27, and 70·3, and in the untreated 54, 81, and 181. Similar figures were obtained in mosaic virus-transmission tests.

There were no fresh notifications of potato wart disease [*Synchytrium endobioticum*] during the period under review. In the Unteriberg district a good beginning was made with the substitution of immune for susceptible varieties, thanks to a reduction in the cost of 'seed' of the former, but fines had to be imposed on a few farmers for negligence in observing the necessary precautions to maintain the purity of the immune varieties. Bordeaux mixture (2 per cent.) still remains unsurpassed for the control of blight (*Phytophthora infestans*), neither the pure organic fungicides

nor other copper compounds (oxychloride, oxide, and carbonate) tested conferring complete protection.

The microscopic examination of wheat seed samples revealed a much wider distribution of dwarf bunt [*Tilletia controversa*: 34, p. 220] than had hitherto been assumed and showed that it is not restricted to high altitudes. Although the season was unfavourable to the development of the disease a large number of new foci were recorded, some in regions where its occurrence had not previously been suspected.

In the Alpine area of black rust [*Puccinia graminis*], the highest summer wheat yields were produced by two of the Experiment Station selections, followed by Regent and Redman. The susceptible Huron and Lichti did not yield even half as much as the two latter varieties, thus affording further evidence that the use of rust-resistant wheats is essential for success in this region.

A high degree of resistance to mildew [*Erysiphe graminis*] was shown by the Ackermann BJM 33 and 34 summer barley selections, obtained by crossing with the resistant Weihenstephaner. BJM 34 in particular is a reliable heavy yielder.

Ghillini (C. A.) & Mezzini (L.). **Elenco dei principali casi fitopatologici riscontrati nel 1953.** [List of the principal plant diseases encountered in 1953.]—*Notiz. Malatt. Piante, 1954*, 28 (N.S. 7), pp. 58–64, 1954.

This list of diseases identified during 1953 at the Observatory of Plant Diseases, Bologna, Italy [*R.A.M.*, 32, p. 62], includes *Peyronellaea veronensis* [loc. cit.] and *Nectria ditissima* [*N. galligena*: C.M.I. map No. 38] on apples, *Microsphaera quercina* [cf. *R.A.M.*, 25, p. 47] on oak, *Botrytis infestans* on hemp, and *Puccinia asparagi* [C.M.I. map No. 216] on asparagus.

Hadžistević (D.). **Pojava biljnih štetočina i bolesti na teritoriji NR Srbije u 1953 godini.** [The incidence of plant pests and diseases in the PR of Serbia in 1953.] —*Zasht. Bilja* (*Plant Prot., Beograd*), *1955*, 27, pp. 89–120, 1 map, 1955. [English summary.]

During the 1953 disease survey in Serbia, Yugoslavia [cf. *R.A.M.*, 34, pp. 20, 705], the following pathogens were found to cause serious damage: *Alternaria solani* [33, p. 279] and *Cladosporium* sp. on potato in Novi Sad, the former also on potato in Priština and on nursery tomatoes; *Ascochyta pisi* on peas [33, p. 279] in Priština; *Cercospora beticola* [33, pp. 280, 545] on sugar and table beet in many districts; *Fomes fulvus* on old, neglected stone-fruit trees; *Cladosporium macrocarpum* on spinach, appearing in early spring in the district of Gračanice; *Mycosphaerella sentina* [? on pear: 30, p. 328], particularly on seedling and nursery plants at Zrenjanin, Novi Sad, and Požarevac; *Peronospora arborescens* on poppy at Zrenjanin; *Plasmopara viticola* [35, p. 75] and *Uncinula necator* [34, p. 135] on vine, causing losses up to 90 (at Zrenjanin) and 80 per cent., respectively; *Pseudoperonospora cubensis* on cucumber [33, p. 279] and melon; *Puccinia allii* on onion [cf. 33, p. 261]; *P. pruni-spinosae* [33, p. 280], defoliating 20 per cent. of the plum trees in Požarevac; *Taphrina pruni* [34, p. 20] also on plum; *T. deformans* [? on peach: 34, p. 134]; *Tilletia levis* [*T. foetida*: loc. cit.] and *T. tritici* [*T. caries*: 34, p. 705] on wheat in the Srem region, reducing yields by up to 15 per cent. (in Timočka Krajina); *Uromyces striatus* on lucerne at Požarevac; and *Bact*[*erium*: *Xanthomonas*] *phaseoli* on bean [*Phaseolus vulgaris*: 30, p. 9] in the vicinity of Novi Sad and Negotin.

Overseas news.—*Commonw. phytopath. News*, 1, 3, pp. 41–45, 39, 1955.

Among the items of general interest in this publication is the statement of J. E. van der Planck in South African notes (pp. 41–42) that a Division of Plant Control and Quarantine has been established in the Department of Agriculture, and quarantine stations are to be set up at Stellenbosch and Durban. A severe epidemic of

tobacco powdery mildew [*Erysiphe cichoracearum*: *R.A.M.*, 33, p. 658] was successfully controlled by karathane, being preferable to sulphur, which taints the tobacco.

R. S. Vasudeva (pp. 42–43) reports from India that a jassid, *Deltocephalus* sp., has been shown to be the vector of *Sesamum* phyllody virus [33, p. 426], which also causes phyllody of brassicas and sann hemp [*Crotalaria juncea*]. Twenty varieties of *S. orientale*, as well as *S. occidentale*, *S. indicum*, and *S. radiatum* proved susceptible. The most prevalent races of *Puccinia graminis* [34, p. 772] in India are 15, 21, 24, 34, 40, 42, 75, 117, 122, 194, 15 C. and 42 B, those of *P. triticina* [34, p. 578] are 10, 11, 20, 26, 63, 106, 107, and 108, and of *P. glumarum* [34, p. 348], 13, 19, 20, 31, A, D, E, F, G, and H. For unexplained reasons the relative importance of races changes, though the cereal varieties grown remain much the same. A perennial grass, *Muhlenbergia hugelii*, was found to be infected by *P. glumarum* race 13 in November.

From Southern Rhodesia G. R. Bates (pp. 43–44) records the first outbreak of *Colletotrichum tabacum* on tobacco [*R.A.M.*, 35, p. 48] in 1953, the disease reappearing the following year despite phytosanitary precautions. Zineb gave good control. Stem break (*Colletotrichum curvatum*) of *Crotalaria juncea* [34, p. 437] has increased in severity since 1947, but seed-borne infection is controlled by thiram seed dressing. Strains from India were as susceptible as the local ones. *Mucuna deeringiana* has been affected by a stem and vine rot due to *Phytophthora* (?) *drechsleri* [C.M.I. map No. 281] for the past two years. The pathogen was specific to *M. deeringiana* and all varieties were highly susceptible in preliminary tests. The species of *Elsinoe* causing spot anthracnose on French bean (*Phaseolus vulgaris*) and cowpea may be new.

E. A. Riley (p. 44) reports from Northern Rhodesia that an increasingly prevalent disease of cowpea is caused by an *Ascochyta* species near *phaseolorum*. Specimens of maize rust (*Puccinia polysora*) [*R.A.M.*, 34, p. 348] from Petauke were heavily infected by *Eudarluca australis*. Tobacco anthracnose (*Colletotrichum tabacum*) [34, p. 707] was effectively controlled by zineb as a pre-planting soil treatment, followed by bi-weekly spraying of the seedlings. *Phytophthora infestans* [C.M.I. map No. 109] on tomatoes and potatoes was recorded for the first time in April 1955.

H. C. Smith (p. 45) notes the results of his studies on black pod (*P. palmivora*) of cacao in Western Samoa [*R.A.M.*, 34, p. 439]. The best control was obtained with a mist blower and concentrated Bordeaux mixture when the crop averaged at least ten pods per tree, and black pod incidence before spraying was over 20 per cent. Removal of fruit from neighbouring papaws affected by *P. palmivora* is recommended. The cacao variety Lafi 7 and other trees showed some resistance but no pods were immune.

C. J. Magee (pp. 45, 39) describes some of the highlights of the conference of Australian plant pathologists held at Hawkesbury Agricultural College, Richmond, New South Wales, from 27th June to 1st July, 1955. Progress in controlling potato virus diseases and bean seed-borne diseases by certification schemes, improved control of some fruit diseases with the newer fungicides, and hopes concerning concentrate spraying of apples and stone fruits were noted. Closer co-operation between plant pathologists and plant breeders in the production of new resistant varieties, extension of certification schemes to budwood, and the cataloguing of citrus trees affected with psorosis [virus: 29, p. 202] with a view to their eradication were discussed.

Department of Agriculture, Kenya, Annual Report 1952. Vol. I. Annual Report 1953. Vol. I.—59 pp., 1953; 65 pp., 1954.

In the section of the first of these reports [cf. *R.A.M.*, 33, p. 214] that deals with

plant pathology (p. 29) it is stated that during 1952 Panama disease [*Fusarium oxysporum* var. *cubense*: C.M.I. map No. 31] appeared in Kenya for the first time; it occurred sporadically along the entire Coastal Belt, affecting mostly sweet, eating bananas.

A reliable technique was devised for the inoculation in laboratory and field of buds and flowers of pyrethrum [*Chrysanthemum cinerariifolium*] by *Ramularia bellunensis* [*R.A.M.*, 34, p. 83], thereby facilitating breeding work.

In the corresponding section of the second report (pp. 33–34) it is stated that in 1953 wheat bunt (*Tilletia foetens*) [*T. foetida*: C.M.I. map No. 295] was recorded for the first time in Kenya. Investigation of brown rot disease of passion fruit (*Alternaria passiflorae*) continues.

The investigations on stem rust of wheat (*Puccinia graminis*) [*R.A.M.*, 33, p. 416] have been transferred to the Plant Breeding Station (pp. 35–37), which will in future deal with cereal diseases generally. Two possibly new physiologic forms of stem rust of wheat [35, p. 7] are being studied. Forms K9 and K12 were the most prevalent in Kenya and Tanganyika, K10 and K11 occurred to lesser extent, and form 6 reappeared.

Andes (J. O.). **Plant disease loss estimates in 1954 for Tennessee.**—*Plant Dis. Reptr*, 39, 3, pp. 280–282, 1955. [Multilithed.]

Despite the extreme drought of 1954 the estimated crop losses due to disease in Tennessee [*R.A.M.*, 35, p. 2] were significant, notwithstanding the limitations of estimates based on observations and opinions, and in some cases were quite heavy. Local losses for the diseases listed (41) ranged from a trace to 25 per cent. and State losses from a trace to 5 per cent. Irrigation is now being resorted to more and more and the practice increased the severity of some diseases, particularly those of vegetable crops. A 10 per cent. local loss of tomatoes, principally under irrigation, was caused by *Phytophthora parasitica* [34, p. 112]. *Cercospora nicotianae* affected only irrigated tobacco [29, p. 438]. The use of resistant tobacco varieties reduced losses caused by *P. parasitica* var. *nicotianae* [34, pp. 552, 823], which, however, has spread to three new counties.

Borisenko (S. I.). Борьба с пыльной головней на семеноводческих посевах. [Control of loose smut on cereal crops.]—Земледелие [*Zemledelie, Moscow*], 3, 4, pp. 114–116, 1955.

In experiments in the U.S.S.R. wheat plants completely free from loose smut [*Ustilago tritici*: *R.A.M.*, 34, p. 717] and covered smut [bunt: *Tilletia caries*: loc. cit.] were obtained by a two-stage hot-water seed treatment. A preliminary soaking at 28° to 32° [C.] was followed by hot water (52° to 53°) for 7 to 8 minutes. The grain was then allowed to cool in water or in a granosan solution (1 gm. per 4 l. of water), the latter resulting in a 30 to 50 per cent. higher germination. The insignificant residual infection after a single-stage hot-water treatment at 45° for three hours or 47° for two does not present a serious danger.

Kobel (F.). **Zum erneuten Auftreten des Gelbrostes auf Weizen.** [On the renewed outbreak of yellow rust on Wheat.]—*Mitt. schweiz. Landw.*, 3, 10, pp. 158–159, 1955.

Yellow rust of wheat [*Puccinia glumarum*: cf. *R.A.M.*, 34, p. 220] has been rare in Switzerland for many years, infection appearing regularly only in the Münster valley and to a negligible extent in a few other limited regions. In 1954, however, the intensity of the disease increased, and in 1955 serious crop losses occurred in several places scattered over Switzerland, some wheat plants becoming completely defoliated. Occasional recurrence of yellow rust outbreaks is expected under suitable climatic conditions and breeding of resistant varieties is recommended.

Hashioka (Y.). **Comparison of the fungicidal action of zineb and lime sulphur to the rusts and the powdery mildew of cereals.**—*Res. Bull. Fac. Agric. Gifu Univ.* 3, pp. 13–19, 7 graphs, 1954. [Japanese summary.]

This information concerning the use of dithane Z-78 to control *Puccinia triticina*, *P. hordei*, and *Erysiphe graminis* on cereals in Japan has already been noticed from another source [*R.A.M.*, 33, p. 287].

Hassebrauk (K.). **Zur physiologischen Spezialisierung des Weizenbraunrostes (Puccinia triticina Erikss.) im Jahre 1953.** [On the physiologic specialization of Wheat brown rust (*Puccinia triticina* Erikss.) in the year 1953.]—*Z. Pflanzenz.*, 34, 4, pp. 441–442, 1955.

The material available for the study of physiologic specialization in *Puccinia triticina* on wheat in Western Germany was relatively scanty in 1953 [*R.A.M.*, 34, p. 29], comprising only 32 samples from 24 localities. The races identified were 1, 15, 17, 53, 93, and the new one collected for the first time in Westphalia in 1952 [loc. cit.]. Races 1 and 17 predominated; the latter, formerly sporadic, increased to a surprising extent in 1953, when its incidence was as high as that of 1, which was previously the most prevalent.

In 30 collections from Yugoslavia races 1, 17 (the most widespread), 53, 57, 93, and the new one were detected.

The separation of a rare biotype of each of the races 1, 17, and 53 was effected by the use of Sicilian Binkel as a supplementary test variety.

Bobkov (E.). Выведение сортов яровой Пшеницы, устойчивых к пыльной головне. [Breeding varieties of spring Wheat resistant to loose smut.]—Земледелие [*Zemledelie, Moscow*], 3, 7, pp. 112–113, 1955.

Fifteen of the 48 wheat hybrids, obtained at the Gorkovskoye State Complex Experiment Station, U.S.S.R., by back-crossing Lutescens 2351, resistant to loose smut [*Ustilago tritici*: see above, p. 93], with the winter varieties Veselopodolyanskoe and PPG 599, were completely free from the disease. Crossing resistant varieties with winter wheat is recommended for obtaining resistant spring wheat.

Prota (U.). **Nuove prove di orientamento nella lotta contro la 'carie' del Frumento condotte in Sardegna nel 1953–54 con prodotti acuprici polverulenti.** [New exploratory experiments in the control of 'bunt' of Wheat carried out in Sardinia in 1953–54 with acupric dust products.]—*Notiz. Malatt. Piante, 1954*, 28 (N.S. 7), pp. 27–37, 2 graphs, 1954.

In a plot experiment carried out at the Technical Agricultural Institute, Sassari, Sardinia, Albimonte wheat seed artificially infected with chlamydospores of *Tilletia* spp. [*T. caries* and *T. foetida*: *R.A.M.*, 29, p. 358; 33, p. 529] at the rate of 1 per cent. by weight of seed was treated with sulphur W.P., sesan Caffaro [29, p. 358], Caffaro powder, agrosan GN [29, p. 92], mercurigamm a(ethyl- and phenyl-mercury salts plus gammexane), cariocida (12 per cent. hexachlorobenzene), S.65 (20 per cent. hexachlorobenzene), and pentagran (sodium pentachlorophenate), all at 200 gm. per q. of seed, except mercurigamma (250 gm.). They gave, respectively, averages of 85·12, 62·62, 58·12, 10·62, 7·75, 1·62, 1·25, and 0 per cent. infected ears.

Lucas (R. L.). **A comparative study of Ophiobolus graminis and Fusarium culmorum in saprophytic colonization of Wheat straw.**—*Ann. appl. Biol.*, 43, 1, pp. 134–143, 1 fig., 1955.

In further studies at the Botany School, Cambridge [*R.A.M.*, 33, p. 147], of the competitive saprophytic ability of *Fusarium culmorum* and *Ophiobolus graminis*, a maize-meal-sand culture of the fungus to be tested was diluted in various proportions by weight with an unsterilized loam adjusted to a moisture content of 40

per cent. saturation. Wheat straws, in lots of 50, after incubation in the mixtures at laboratory temperature for one month, were tested individually for saprophytic colonization by the inoculant fungus by means of a wheat seedling test [loc. cit.; 18, p. 172].

With nodal straw pieces (a node and about 1 in. of culm and leaf sheath above) there was a progressive reduction in saprophytic colonization with increasing proportion of unsterilized soil. This reduction occurred more rapidly with *O. graminis* than with *F. culmorum*, indicating a difference in their competitive saprophytic ability. Pre-treatment of the straws with dextrose decreased the percentage of test seedlings infected by *O. graminis*, whereas sodium nitrate increased it. When these two pre-treatments were combined, the effect of the nitrate usually outweighed that of dextrose. Pre-treatment with ammonium sulphate decreased infection, particularly with added dextrose, the effect reaching a maximum with 2 to 5 per cent. of soil in the mixture and declining with higher proportions until at 50 per cent. it became reversed.

The percentage of internodal straw pieces (culm only) colonized by *O. graminis* was high, even at low levels of inoculum. The addition of maize meal to the soil one month before admixture with inoculum decreased colonization. When the soil and inoculum were incubated together for one week before putting in the straws the over-all percentage of colonization by *O. graminis* was lower than when the straws were added at mixing. With *F. culmorum* the reverse was true in two of the three pre-treatment series.

Internodal pieces and nodal straws without an encircling leaf sheath gave higher percentages of infected test seedlings than did nodal straws with the leaf sheath attached. Other experimental evidence indicated that *O. graminis* is unlikely to spread saprophytically from infected wheat stubble that has been ploughed in.

The results of the investigation indicate a greater competitive saprophytic ability in *O. graminis* than might be expected from work with some other specialized root parasites. In some of the experiments the difference in behaviour between *O. graminis* and *F. culmorum* was not great and it seems likely that the outcome of saprophytic competition in the natural soil environment may be decided by smaller differences in saprophytic ability than has hitherto been suspected. The experiments also emphasize the important effects that may be produced by small details of technique.

JOHNSTON (T. H.). **Inheritance of resistance to certain physiologic races of loose smut, Ustilago nuda (Jens.) Rostr., in winter Barley.**—Abs. in *Iowa St. Coll. J. Sci.* 28, 3, pp. 346–347, 1954.

In experiments at Oklahoma Agricultural Experiment Station, Stillwater, seven winter barley varieties resistant to loose smut (*Ustilago nuda*) [*R.A.M.*, 33, p. 225] or adapted to Oklahoma conditions were crossed in nearly all possible ways. Spore inoculum, selected from eight tentatively designated races and comprising seven sets or cross-race combinations, was injected into the plants.

Harbine, which had resisted most races in 1950, was susceptible in 1952 to at least five races, some of which are assumed to be very similar if not the same. Significant differences of emergence occurred between lines in four of the seven hybrid combinations. There were no significant differences in smut infection between lines of any resistant parent, but there were between those from the susceptible parent Ward and among lines of hybrids of each of the seven cross-race combinations. Resistance in N.C.H. 26 was dominant. That of Dohadak to race 4 seemed to be due to a majority of relatively few genes. Both Harbine and Ward proved susceptible to races 3 and 6.

All the morphological characters studied appeared to be independent of reaction to loose smut, though the probability value between smut reaction and seed cover-

ing was only 0·05 to 0·1. Certain resistant F_3 plants are being grown for further selection.

HASKETT (W. C.). **Barley scab.**—Abs. in *Iowa St. Coll. J. Sci.*, 28, 3, pp. 331–332, 1954.

Isolations from barley grain grown in Iowa in 1951 and 1952 showed that scab (*Gibberella zeae*) [*R.A.M.*, 29, p. 82] is a major problem. There was an average of 5 per cent. infection, with some samples as high as 11 per cent. Other fungi commonly isolated were *Helminthosporium sativum* [33, p. 476], *H.* [*Pyrenophora*] *teres*, especially on Moore barley, and *Alternaria* spp.

The optimum temperature for vegetative growth and conidial production by *G. zeae* was 25° to 30° C.; for spore germination approximately 30°. Needle inoculations showed spring barley to be susceptible at any stage, the critical period being from flowering to the milk stage. Infection was favoured by high temperatures, while entry through dehisced anthers seemed to be one of the primary avenues of initial infection.

In varietal resistance tests at Ames and Kanawha there was a moderate to heavy occurrence of *G. zeae* and *H. sativum*; 15 barley introductions, mostly of the Manchuria six-rowed type, were classed as partially resistant to *G. zeae* and *H. sativum* headblight. Of 623 introductions, 75 had 5 per cent. or less seeds infected by both *G. zeae* and *H. sativum*. Most promising were C.I. numbers 1113, 2551, 3197, 3512, 4195–2, 4427–1, 4445, 4445–1, 4458, 4795, 4820, 4825, 4883, and 4893. Of 30 susceptible named varieties, Chevron and Peatland showed the lowest blight incidence.

STANTON (T. R.). **Oat identification and classification.**—*Tech. Bull. U.S. Dep. Agric.* 1100, 206 pp., 2 col. pl., 156 figs., 1 map, 1955.

This bulletin covers the description, history, distribution, and synonymy of the botanical and agricultural varieties of oats grown commercially. Degrees of resistance or susceptibility to fungus and virus diseases are indicated briefly in the varietal descriptions. There is a comprehensive bibliography of 215 titles and an index to species, varieties, and synonyms.

FINKNER (R. E.). **Inheritance of resistance to two races of crown rust in Oats.**—Abs. in *Iowa St. Coll. J. Sci.*, 28, 3, p. 314, 1954.

In further work at Iowa State College on the mode of inheritance of reaction to *Puccinia coronata avenae* [cf. *R.A.M.*, 32, p. 75; 33, pp. 475, 665] races 57 and 109 were used on a number of oat crosses between Clinton, Ukraine, Santa Fe, Trispernia, Landhafer, Klein 69b, and Victoria. The resistance of Clinton to 109 was conditioned by a single dominant (A), that of Ukraine by M, that of Landhafter and Klein 69b to both races by single partial dominants L and K, respectively, while two dominant linked genes were present in Santa Fe (M_1U_1) and Trispernia (M_2V_1). The V factor in Victoria also conferred resistance to race 109.

SEGALL (R. H.) & VÉLES FORTUÑO (J.). **Gibberella fujikuroi the cause of bud rot of Corn in Puerto Rico.**—*Plant Dis. Reptr*, 39, 3, p. 283, 1955. [Multilithed.]

During the autumn of 1954 a serious outbreak of bud rot (*Gibberella fujikuroi*) destroyed the experimental maize hybrids growing in a field at Isabela, Puerto Rico [*R.A.M.*, 24, p. 494], adjacent to sugar-cane also infected by *G. fujikuroi* [28, p. 244].

RAMAKRISHNAN (T. S.) & SUNDARAM (N. V.). **Studies of the rust on Setaria italica.**—*Proc. Indian Acad. Sci.*, Sect. B., 41, 6, pp. 241–246, 1 pl., 1955.

Tenai or Korra millet (*Setaria italica*), grown in many States of South India,

suffers heavy damage from *Uromyces setariae-italicae* [*R.A.M.*, 29, p. 506]. In Tudiyalur, Coimbatore, where successive crops are raised under irrigation, severe damage is frequent; rust is observed throughout the year with peaks in June and July and from October to January, the crop being affected in all stages, with the greatest reduction in yield when infection occurs before flowering.

All the indigenous varieties tested at Coimbatore were found susceptible. Of 18 Japanese varieties inoculated in the greenhouse, Yamada, Shira hama, Jiro Awa, Honen, and Kokubu Awa were immune and Kuro Tsume, Taiso Shiro Awa, Komabara Shiguru, Uruchi Awa, Shimabara, and Wase Awa had 5 per cent. infection or less. The five immune varieties developed no rust in the field; Honen and Taiso Shiro Awa produced good ears and are worth propagating.

Eriochloa procera, a common field grass, was susceptible to the millet rust.

Philippe (J.). **Comment reconnaître et contrôler les principaux ennemis des Agrumes au Congo belge.** [How to recognize and control the principal enemies of Citrus in the Belgian Congo.]—*Bull. Inform. Inst. agron. Congo belge*, 4, 1, pp. 13–25, 9 figs., 1955.

A brief account is given in semi-popular terms of the symptoms, incidence, and control of the following diseases of citrus, chiefly occurring in the Lower Congo: 'tristeza' [virus C.M.I. map No. 289], widespread and probably present throughout the country; psorosis virus [No. 65] on Washington Navel orange; gummosis (*Phytophthora* sp.), found especially on lemon grafted on rough lemon in low, damp situations; scab (*Elsinoe fawcetti*) [*R.A.M.*, 28, p. 31; 29, p. 293], relatively unimportant, present chiefly on rough lemon seedlings in nurseries though occasionally infecting the leaves of adult trees, mainly lemon and bitter orange; and canker (*Phytomonas* [*Xanthomonas*] *citri*) [C.M.I. map No. 11], which seriously affects grapefruit, oranges, and mandarins.

Harris (R. J.). **The propagation of Citrus in the Keravat-Rabaul area.**—*Papua & N. Guinea agric. Gaz.*, 8, 3, pp. 7–17, 6 figs., 1954.

Investigations started in 1949 at the Lowlands Agricultural Experiment Station, Keravat, New Guinea, showed that the following citrus diseases, the symptoms and control of which are briefly described, occur in the Keravat-Rabaul area: die-back (*Diplodia* [*natalensis*]), canker (*Phytomonas* [*Xanthomonas*] *citri*) [cf. *R.A.M.*, 34, p. 780], pink disease (*Corticium salmonicolor*) [C.M.I. map No. 122; cf. *R.A.M.*, 32, p. 304], damping-off (*Pythium* spp.), and minor element deficiencies, including those of zinc, magnesium, and copper.

Grierson (W.) & Newhall (W. F.). **Tolerance to ethylene of various types of Citrus fruit.** –*Proc. Amer. Soc. hort. Sci.*, 65, pp. 244–250, 4 diags., 5 graphs, 1955.

Experiments in the 1952–3 season at the Florida Citrus Experiment Station, Lake Alfred, demonstrated that total storage losses three weeks after picking Temple, Hamlin, and Valencia oranges, Duncan and Red Foster grapefruit, and tangerines increased with increasing concentration of ethylene [*R.A.M.*, 31, p. 543; 35, p. 13] used in colouring and with longer exposure to a given concentration. Temple was particularly sensitive. This increase in decay was attributed to the resultant increases in stem-end rot [*Diplodia natalensis*: 28, p. 625], with epidermal injury (gas burn) as a secondary factor for Temple oranges and tangerines. It is concluded that total losses of citrus fruit may be reduced appreciably by using the minimum ethylene concentration required and removing treated fruits from the gas as soon as possible.

LEONARD (C. D.) & STEWART (I.). **Fruit burn caused by chelated iron.**—*Citrus Mag.*, 15, 9, pp. 19, 22, 1953. [Abs. in *Biol. Abstr.*, 28, 1, pp. 208–209, 1954.]

Iron chelated with ethylenediamine tetra-acetic acid (iron EDTA) applied to iron-deficient citrus trees at Lake Alfred, Florida, corrected the condition well [*R.A.M.*, 32, p. 429], but when broadcast by fertilizer spreaders it produced fruit burning, especially at the stem ends. Fruit drop also occurred, losses in some instances exceeding a box per tree. It is recommended that only trees displaying iron deficiency symptoms [35, p. 41] should be fertilized with chelated iron, applications being made carefully by hand when there is no fruit on the tree.

KAUDY (J. C.), BINGHAM (F. T.), MCCOLLOCH (R. C.), LIEBIG (G. F.), & VANSELOW (A. P.). **Contamination of Citrus foliage by fluorine from air pollution in major California Citrus areas.**—*Proc. Amer. Soc. hort. Sci.*, 65, pp. 121–127, 1 map, 1955.

The main substance of this work at the University of California Citrus Experiment Station, Riverside, on fluorine analysis of leaves from about 130 citrus groves has been noticed from another source [*R.A.M.*, 34, p. 784]. Samples from 12 groves over a nine-month period disclosed a maximum fluorine accumulation during the summer and autumn, concentrations increasing very little once the winter rains commenced.

MIDDLETON (J. T.). **Air pollution effect on Citrus.**—*Calif. Citrogr.*, 40, 9, pp. 330, 352–353, 1955.

At the University of California Citrus Experiment Station [Riverside], fumigation of young grapefruit trees for 16 to 24 hours with a mixture of ozone and hexene at an oxidant level of 4 to 6 p.p.m. caused visible injury, characterized by a general silvering of the lower surface of the leaves. Ozone alone caused mottling and tissue collapse and clearing of parts of the leaf. At about 100° F. 7 p.p.m. ozone produced severe burning of grapefruit and Valencia orange fruits and a leaf mottling on sour orange and lemon.

Fumigation with sulphur dioxide caused bleaching of sweet and sour orange leaves; sweet orange trees also tended to defoliate, and the leaves were rolled. Visible damage to citrus foliage in the field is, however, unlikely, since the injurious concentrations were ten times higher than those in naturally polluted air.

DUDDINGTON (C. L.). **A new species of Stylopage capturing Nematodes.**—*Mycologia*, 47, 2, pp. 245–248, 1 pl., 1955.

A description is given of *Stylopage grandis* n.sp., isolated from rotting vegetable matter from the floor of Ashtead Wood, Surrey, England. It is an endoparasite of nematodes [cf. *R.A.M.*, 32, p. 313], capturing them by means of sticky secretion from the mycelium, apparently only produced on contact with the prey. Conidia formed abundantly after an initial period of feeding. The fertile hyphae, slender and erect, rose to a height of 300 to 500 μ. Each bore at its apex a large conidium. Sometimes a second spore formed after further elongation of the conidiophore. The obovoid or pyriform conidia measured (22–) 27 to 61 μ long by 13 to 26 μ across the greatest diameter.

SHEPHERD (AUDREY M.). **Harposporium crassum sp. nov.**—*Trans. Brit. mycol. Soc.*, 38, 1, pp. 47–48, 1 fig., 1955.

Six weeks after a maize meal agar plate had been inoculated with horse dung from Ågård, Denmark, nematodes emerging from the inoculum were killed by a fungus designated *Harposporium crassum* n.sp. The coarse, endozoic mycelium of branched, septate, short-celled, thick-walled hyphae, 5·5 to 6·5 μ wide, produced

fine, septate branches 1·5 to 2·5 μ wide which protruded from the eelworms 50 to 150 μ into the surrounding medium and gave rise to subspherical fertile branches 2·5 to 4·5 μ in diameter bearing arcuate, hyaline, aseptate conidia 18 to 22 by 2 to 3 μ.

ATKINS (D.). **Pythium thalassium sp. nov. infecting the egg-mass of the Pea-Crab, Pinnotheres pisum.**—*Trans. Brit. mycol. Soc.*, 38, 1, pp. 31–46, 9 figs., 1955.

In the course of studies at the Marine Biological Laboratory, Plymouth, Devon, in June, 1929, eggs of the pea-crab, *Pinnotheres pisum*, parasitic on mussels (*Mytilus edulis*) from the Camel Estuary, Padstow, Cornwall, were found to be parasitized by *Pythium thalassium* n.sp., which can parasitize other crustacean eggs and is also a saprophyte. The sporangia are filamentous and proliferating, dehiscing extramatrically. Spherical and pyriform bodies, 25–52 μ, developed at the apex of extruding hyphae, but no sex organs were seen.

WEBER (N. A.). **Fungus-growing ants and their fungi: Cyphomyrmex rimosus minutus Mayr.**—*J. Wash. Acad. Sci.*, 45, 9, pp. 275–281, 2 figs., 1955.

A study was made of the ant *Cyphomyrmex rimosus minutus* and its fungus, *Tyridiomyces formicarum* in central Florida [*R.A.M.*, 34, p. 300]. The fungus gardens consist of polygonal masses termed bromatia, measuring $\frac{1}{4}$ to $\frac{1}{2}$ mm. in diameter and comprising solid cell masses. When grown on Sabouraud's dextrose agar a single bromatium increased in size and a cluster of bromatia in both size and number, both later developing a morel-like growth 0·43 to 0·49 mm. thick.

REEDER (E. T.) & VANTERPOOL (T. C.). **Phoma spp. on Flax in Saskatchewan.**—Abs. in *Proc. Canad. phytopath. Soc.*, 21, p. 16, 1953.

At the University of Saskatchewan, Saskatoon, *Phoma exigua* [*R.A.M.*, 26, p. 8; 32, p. 187] isolated from flax seed, but rarely found on growing flax, reduced germination 75 per cent. by pre-emergence killing. Moderate resistance was shown only by Victory flax. The fungus overwinters on flax stubble. In liquid culture it produces a substance inhibiting germination. *Phoma conidiogena*, isolated from bolls and seeds, and *Ascochyta* spp., commonly isolated, were non-pathogenic to flax.

Comparative studies with species of these genera associated with flax root rot from the British Isles [32, p. 625] and Canada led the authors to conclude that two Scottish isolates [loc. cit.], one from Northern Ireland, and *A. linicola* from Baarn should be included in *P. lini*, owing to the absence or low percentage (1 to 4) of bicellular spores. *P. lini* has not been found in western Canada.

GHOSH (T.) & GEORGE (K. V.). **Sclerotium rolfsii Sacc. on Jute and its perfect stage.**—*Indian J. agric. Sci.*, 25, 3, pp. 171–173, 2 pl., 1955.

Since 1948 attacks of *Sclerotium rolfsii* on jute stems at Chinsurah, India [*R.A.M.*, 33, p. 722], have extended well above ground level, forming concentric rings or alternate dark and light brown zones round the point of infection. In August, 1949, on one plant of JRO-753 some of the fertile cells on the mycelium formed true basidia of *Corticium rolfsii*. In cultures with an *Aspergillus* and a *Bacterium* species on standard potato dextrose agar the perfect state was again formed. The authors consider that there is sufficient reason to retain the name *Pellicularia rolfsii* for the fungus.

THROWER (L. B.). **New and interesting identifications. Helminthosporium disease of Manila Hemp.**—*Papua & N. Guinea agric. Gaz.*, 8, 4, p. 41, 1954.

Stem rot (*Helminthosporium torulosum*) of *Musa textilis* [*R.A.M.*, 33, p. 723], was recorded in Papua and New Guinea in May, 1954, at Bubia, and later, at Keravat. The presence of other hosts, e.g., banana [cf. 33, p. 758], renders the

elimination of the pathogen impossible. Resistance in *M. textilis* varied considerably with individual plants.

Kassanis (B.). **Some properties of four viruses isolated from Carnation plants.**—*Ann. appl. Biol.*, 43, 1, pp. 103–113, 1 pl., 1955.

Studies were carried out at Rothamsted Experimental Station on four viruses isolated from commercial carnations. Carnation ring spot [*R.A.M.*, 33, p. 585], probably identical with the Dutch carnation mosaic virus [31, p. 123] but renamed to distinguish it from the apparently different carnation mosaic virus in the United States [32, p. 128], produced necrotic, often concentric, rings on mechanically inoculated leaves of Sutton's Improved Marguerite Scarlet carnation seedlings. Systemically infected leaves sometimes developed similar lesions, but more often a conspicuous mosaic, with some necrotic flecks. In commercial varieties the commonest symptoms were necrotic spots, combined with a reddening and curling of the older leaves. Inoculated sweet william (*Dianthus barbatus*) seedlings developed local lesions, usually concentric rings, in three to four days; two or three days later the young leaves developed vein-clearing, which was followed by a general mosaic with scattered white necrotic rings. Symptoms on various hosts were different from those produced by the Rothamsted tobacco necrosis virus [cf. 31, pp. 122, 169].

Carnation mottle virus caused vein-clearing in the young leaves of *D. barbatus* after about eight days. This soon faded and was replaced by a general mild mosaic. In seedling carnations the only effect was a very mild general mosaic. All attempts to transmit the virus to hosts other than *Dianthus* failed. Examined under the electron microscope the virus consisted of uniform spherical particles about 32 mμ in diameter; those of ring spot were similar, about 19 mμ. Both viruses survived heating for ten minutes at 85°, but not at 90°, and remained active at room temperature in *D. barbatus* sap for more than two weeks. They were not serologically related and neither was transmitted by *Myzus persicae*.

The author names the third virus carnation vein mottle virus. In *D. barbatus* and carnation leaves the first sign of infection was a vein-clearing in the young leaves progressing into chlorotic spots or patterns, mostly along the veins. The symptoms were generally more distinct than those caused by carnation mottle virus, but the two viruses were readily distinguished by serological tests and the fact that vein mottle was readily transmitted to *D. barbatus* by *M. persicae*. It was inactivated in ten minutes between 50° and 55° and in ten to 14 days at room temperature.

The existence of a carnation latent virus [33, p. 483], producing no symptoms in carnation and sweet william, but increasing the severity of vein mottle symptoms when the two viruses were present together, was established by serological tests.

It is recommended that virus-free propagation stock should be isolated from the flowering stock, kept insect-free, frequently inspected and rogued, and checked occasionally for virus infection by inoculating *D. barbatus* plants or making serological tests. Carnations can be freed from ring spot virus by exposure to 36° for 24 days [34, p. 512].

Grouet (Mme D.). **Recherches de quelques données fondamentales sur l'Entyloma dahliae Sydow.** [A search for some fundamental data concerning *Entyloma dahliae* Sydow.]—*Phytiatrie-Phytopharm.*, 3, 1, pp. 9–13, 1954.

Entyloma dahliae [*R.A.M.*, 31, p. 607], chiefly known as a parasite of the basal leaves of dahlia plants at the end of the summer, has recently been the cause of far more severe damage to young market plants and cuttings in the Paris region during April and May. Highly susceptible varieties such as Anita are killed. The present study was aimed at devising a means of control. The incubation period

remained constant at 12 to 15 days irrespective of fluctuating temperatures. A further period up to eight days under humid conditions was necessary for any marked symptom expression. The mycelium apparently overwinters in the soil rather than in the tubers. Under favourable conditions symptoms appeared on seedlings in soil mixed with either diseased leaf debris or the inoculum used to infect the leaves. A fungus considered to be *E. dahliae* was isolated from leaf lesions after disinfection with sodium hypochlorite. Although all varieties are affected during a severe attack Souvenir de Jâcques Brough, Grâce Douglas, Marthe Barbot, Capnice, and Denise Brauché showed signs of resistance.

USCHDRAWEIT (H. A.). **Eine Viruskrankheit bei der Gattung Fuchsia.** [A virus disease of the genus *Fuchsia*.]—*Gartenwelt*, 55, 9, pp. 147–148, 1 fig., 1955.

In 1953 symptoms of stunted growth, leaf discoloration, and impaired flower formation were observed on *Fuchsia corymbiflora* and, to a lesser extent, *F. boliviana* at the Institute for Horticultural Virus Research, Berlin-Dahlem. Leaves were irregular and narrow with their margins curled downwards, young ones turned pale yellow-brown, and the older became mottled reddish and yellow.

The symptoms were graft-transmissible within and between the two species, but not to *F. fulgens* and other *Fuchsia* spp., varieties, or hybrids. Sap transmissions to various test plants gave no result. There is no evidence that vectors play a part in the spread of the disease which, owing to its restriction to the two named species, is not of economic importance; diseased plants should, however, be eradicated.

PODHRADSZKY (J.). **The Sunflower-Peronospora (Plasmopara halstedii) Farl. (Berl. et Toni), a disease new to the Sunflower in Hungary.**—*Növénytermelés*, 3, 1–2, pp. 129–134, 1954. [Abs. in *Hung. agric. Rev.*, 3, 4, p. 11, 1954.]

Plasmopara halstedii, first noted on sunflower in Hungary [C.M.I. map No. 286] in 1949, is believed to have been introduced from Rumania and Yugoslavia [*R.A.M.*, 31, p. 609 and cf. next abstract]. In 1953 the disease was restricted to the south-east, but recent observations show that it is spreading across to the west, indicating that it may become serious. Use of clean seed, four- to five-year crop rotations, and breeding resistant varieties are advocated.

YAGODKINA (Mme V. P.). Ложная мучнистая роса Подсолнечника в Краснодарском крае. [Downy mildew of Sunflower in the Krasnodar region.]—Земледелие [*Zemledelie, Moscow*], 3, 7, pp. 95–97, 1 fig., 1955.

Sunflower downy mildew (*Plasmopara halstedii*) is reported to be affecting up to 61 per cent. of the plants in some fields in the Krasnodar region of the U.S.S.R. [*R.A.M.*, 12, p. 571 and cf. preceding abstract], where it has so far been recorded on sunflowers only. It is suggested that a special race of the fungus, peculiar to sunflower, is spreading. The following control measures are recommended: careful crop rotation with sunflowers occupying only isolated fields, elimination of volunteer plants in the summer, and the ploughing of heavily infected fields which should then be planted with another crop.

SACKSTON (W. E.). **Some effects of rust on Sunflowers.**—Abs. in *Proc. Canad. phytopath. Soc.*, 21, p. 17, 1953.

During 1952, field experiments at the Plant Pathology Laboratory, Winnipeg, Manitoba, with the sunflowers Sunrise and S37–388, the male and female parents of the commercial variety Advance, demonstrated that the severity of *Puccinia helianthi* [*R.A.M.*, 34, p. 652 and next abstract] increased with early inoculation (the yields being 17 and 68 per cent. less, respectively, than the controls) but was not affected by the date of sowing. The mean seed weight and oil content were not significantly lower in the inoculated plants than in the controls.

Sackston (W. E.). **Preliminary investigations on the chemical control of Sunflower rust.**—Abs. in *Proc. Canad. phytopath. Soc.*, 21, pp. 17–18, 1953.

Field trials during 1952 at the Plant Pathology Laboratory, Winnipeg, to assess the effectiveness of various fungicides against sunflower rust [*Puccinia helianthi*: see preceding abstract], showed that increases in seed yield resulting from the various treatments were, for parzate 98 per cent., manzate 78, sulphur 43, all applied as dusts, and phygon XL spray 9. Calcium sulphamate, an eradicant for wheat stem rust [*Puccinia graminis*], was not satisfactory against sunflower rust. To be effective parzate spray required to be applied to seedlings prior to inoculation.

Sprague (R.). **Some leafspot fungi on Western Gramineae—VIII.**—*Mycologia*, 47, 2, pp. 249–262, 1 fig., 1955.

This final contribution to the present series [*R.A.M.*, 33, p. 607], on new and noteworthy fungi found causing leaf spots of Gramineae in south-eastern Alaska in 1952, includes one new species, *Leptosphaeria muirensis* on *Poa annua*, *Hendersonia crastophila* on the same host, *Mastigosporium rubricosum* on *Agrostis stolonifera*, *Colletotrichum graminicola* on *Phalaris arundinacea* var. *picta*, *Pyrenophora tritici-repentis* on *Agropyron subsecundum*, *Heterosporium phlei* on *Phleum alpinum*, *Ophiobolus graminis* on *Agrostis exarata*, and *Erysiphe graminis* on *Bromus sitchensis*, a hitherto unreported host. *Darluca filum* was prevalent on grass rusts [*Puccinia* spp.], being particularly severe on *P. poae-sudeticae* on *Phleum alpinum*.

Fulkerson (R. S.) & Tossell (W. E.). **Seed treatment of forage legumes and grasses with three antibiotics.**—*Canad. J. agric. Sci.*, 35, 3, pp. 259–263, 2 pl., 1955.

At Ontario Agricultural College, Guelph, seed treatment with aureomycin, penicillin, and terramycin stimulated seedling growth [cf. *R.A.M.*, 34, p. 49] markedly in lucerne and moderately in red clover in the greenhouse but not in the field. Brome grass [*Bromus* sp.] responded by small variable differences in the number of seedlings established. The over-all results with five forage crops indicate that recommendation for seed treatment with these antibiotics is not justified.

McDonald (W. C.). **The distribution and pathogenicity of the fungi associated with crown and root rotting of Alfalfa in Manitoba.**—*Canad. J. agric. Sci.*, 35, 3, pp. 309–321, 2 pl., 1955.

Crown and root rot of lucerne in Manitoba, Canada, causes a progressive deterioration after the second year, rendering the maintenance of fields uneconomical by the end of the fourth or fifth year and constituting a serious problem to growers using lucerne for seed or permanent pastures. The distribution of a number of fungi responsible for the rotting was determined with respect to the soil type, season, age of stand, and part of the root system from which they were isolated. *Pythium debaryanum*, *Rhizoctonia* [*Corticium*] *solani* [*R.A.M.*, 32, p. 486], and *Fusarium oxysporum* were the principal seedling pathogens, the first two being of no importance on well established plants. *Ascochyta imperfecta* [loc. cit.], causing a crown bud rot and root rot, *Plenodomus meliloti* [loc. cit.], and *Cylindrocarpon ehrenbergi* attacked mature plants in the spring. Of the summer pathogens encountered, *Corticium solani*, also causing a crown bud rot, was the most important, *Pyrenochaeta terrestris* in sandy soils and *Fusarium* spp. in heavy black soils apparently being secondary invaders. *Stagonospora meliloti* [34, p. 791], not previously reported on this host in Canada, was isolated predominantly from older stands where it caused crown rot and vascular discoloration.

New Apple disease.—*Agric. Gaz. N.S.W.*, 65, 7, p. 350, 1955.

A new apple disease, described as an eye rot, caused by a species of *Botrytis* [cf. *R.A.M.*, 33, p. 236], was recently detected on Granny Smith and Rome Beauty apples at Batlow, New South Wales, Australia.

KRISTENSEN (H. R.). **Furede grene hos Æbletræer. I.** [Flat limb of Apple trees. I.]—*Tidsskr. Planteavl*, 59, 2, pp. 234–251, 4 figs., 1955. [English summary.]

This is an expanded, tabulated survey of the information already presented from another source on flat limb virus of apple trees in Denmark [*R.A.M.*, 34, p. 527].

CIFERRI (R.), RUI (D.), & REFATTI (E.). **La presenza degli 'scopazzi' del Melo nel Ferrarese e la sua eziologia virosica.** [The presence of 'witches broom' of Apple in the Ferrara area and the virus nature of its etiology.]—*Notiz. Malatt. Piante, 1955*, 30 (N.S. 9), pp. 10–17, 4 figs., 1955.

After stating that witches' broom of apple trees [cf. *R.A.M.*, 34, pp. 230, 598], found near Verona, Italy, in 1950, and in the provinces of Trento and Bolzano in 1954, is now present in the vicinity of Ferrara, the authors recapitulate their reasons for considering it to be due to a virus.

BRAUN (H.). **Die Kragenfäule des Apfels.** [Collar rot of the Apple.]—*Meded. LandbHogesch. Gent*, 19, 3, pp. 504–510, 1954.

A destructive collar rot of ten-year-old Cox's Orange Pippin apple trees on [East Malling] type IX rootstocks was first observed in the Rhineland in 1950, and in 1951 *Phytophthora cactorum* [cf. *R.A.M.*, 33, p. 359 and next abstract] was isolated from the diseased material and used in inoculation experiments with positive results. Enquiries elicited the information that the disease appeared for the first time near Coblenz in 1942, spreading the next year to Essen and subsequently to other localities, mostly in northern Rhineland and Westphalia; it is not, however, confined to the Rhine, Moselle, and Neckar Valleys but is found also on high, open sites up to 20 km. from the rivers. In 1952 infection was notified on about 1,200 trees and in 1953 on 2,500, and at the time of writing over 50 properties were involved. Collar rot has also been reported to the author from other countries [loc. cit.], including Belgium.

In the course of a discussion on the possible existence of physiologic specialization in *P. cactorum*, reference is made to the detection in 1952 of a strawberry root rot [cf. 10, p. 435 *et passim*] caused by the fungus in the Vierlanden market-gardening area of the Lower Elbe, recently reported by Deutschmann.

Besides Cox's Orange, a number of other apple varieties were subsequently found to be affected, including Freiherr von Berlepsch, James Grieve, and Ananas [Pineapple] Pippin. The development of resistant varieties is complicated by the fact that inoculation tests on trees under eight years old give negative results, and growers are unwilling to part with material of this age for experimental purposes. Important precautionary measures to be taken are avoidance of contact between the graft-union and the soil and of all kinds of injuries which afford ingress to the fungus. Moreover, in case invisible wounds and fissures should be present, the root-collar and stem base should be continuously protected by a copper coating, necessitating repeated applications throughout the year, or at any rate from the onset of growth, of 3 to 5 per cent. copper-lime (or 1 to 2 per cent. of a highly concentrated preparation), with the addition of a wetter.

BUDDENHAGEN (I. W.). **Various aspects of Phytophthora cactorum collar-rot of Apple trees in the Netherlands.**—*Tijdschr. PlZiekt.*, 61, 4, pp. 122–129, 3 figs., 2 graphs, 1955. [Dutch summary.]

Collar rot (*Phytophthora cactorum*) is responsible for severe damage on the Cox's Orange Pippin apple variety [see preceding abstract] in the provinces of Limburg and Zeeland, Holland, attacking 50 to 75 per cent. of the trees in some orchards. The only other variety so far known to be susceptible is Allington Pippin. In inoculation tests on six varieties large cankers developed only on Cox's Orange Pippin. Isolates of *P. cactorum* from pear fruits caused as heavy damage to the

Cox stems as that induced by collar-rot isolates, while a strain of *P. syringae* capable of growth at 25° C., which was obtained from pear and apple fruits [*R.A.M.*, II, p. 111], was even more pathogenic. In inoculation tests on cut pieces of branch the effects of *P. syringae* were most severe at 5°, 10°, and 15°, whereas *P. cactorum* was innocuous at the two lowest temperatures and highly pathogenic at 20°, 25°, and 30°. In the case of *P. cactorum* there was a close correlation between the growth rate on potato dextrose agar and canker size, whereas in that of *P. syringae* (from pear) there was not. Isolates of *P. parasitica*, *P. c.* var. *applanata* from lilac in the United States [II, p. 580], and *P. hibernalis* from orange in Portugal failed to cause measurable infection on apple branches.

Pending the results of the studies now in progress on various possibilities of control, certain cultural practices are recommended. For instance, mounding round trees to prevent windthrow, and thus bringing soil in contact with the stem, mechanical injury, and irrigation should be avoided. Where the graft line is at or below soil-level the soil should be removed to expose the Cox scion and preclude root production therefrom. In future, grafting operations should be performed at the highest practicable level. Cankers do not extend below the graft into the stock.

PHILLIPS (W. R.), POAPST (P. A.), & RHEAUME (B. J.). **The effect of temperature near 32 degrees F. on the storage behaviour of McIntosh Apples.** *Proc. Amer. Soc. hort. Sci.*, 65, pp. 214–222, 5 graphs, 1955.

In studies at the Department of Agriculture, Ottawa, the eating quality, based on flavour and texture, of McIntosh apples [*R.A.M.*, 30, p. 517] from the 1952 and 1953 crops was best after approximately three months' storage at 36° F.; there was little difference when a storage temperature of 30° was used. Subsequently there was loss of quality, the rate of deterioration being determined by the storage temperature, differences of only 1° having a marked effect, but this was nullified by the onset of core flush.

RUI (D.) & BONFANTE (S.). **Le cause della 'maculatura non parassitaria' delle foglie di Melo.** [The causes of 'non-parasitic spotting' of Apple leaves.]—*Notiz. Malatt. Piante, 1954*, 28 (N.S. 7), pp. 12–26, 4 figs., 2 graphs, 1954.

Since 1951 apple trees growing in the vicinity of Venice and Ferrara, Italy, have been affected by an apparently non-parasitic leaf spot. Two types of spotting, 'punctiform' and 'maculiform', are present on the same tree and frequently on the same leaf. Punctiform spots are not more than 0·5 mm. in diameter, often confluent, and chestnut-brown. They are generally present only on the upper surface and are always localized between the veins. 'Maculiform' spots are up to 10 mm. in diameter, mostly interveinal, frequently confluent, usually chestnut-brown, and generally have a distinct outline, sometimes surrounded by a narrow halo. Affected leaves are irregularly distributed, and those very severely injured turn yellow and fall, or wither while still attached to the tree. Small fruits also become spotted and later wrinkled near the calyx.

As a result of spraying experiments at the Phytopathological Institute of Venetia-Verona and observations in the same neighbourhood it is concluded that the spotting in question was due to the phytotoxic effects of copper sprays applied against *Venturia inaequalis* when the temperature was under 18° C. and the relative humidity persistently high, conditions which regularly prevail during spring in parts of the Po valley. Where they obtain, copper treatments should be replaced by applications of colloidal sulphur or organic fungicides.

HALL (E. G.) & SYKES (S. M.). **Effects of skin coatings on the behaviour of Apples in storage. IV. Comparisons of skin coatings and gas (controlled atmosphere) storage.**—*Aust. J. agric. Res.*, 5, 4, pp. 626–648, 1 pl., 8 graphs, 1954.

In further experiments carried out in New South Wales from 1941 to 1946 on

the effects of skin coatings on stored apples [*R.A.M.*, 33, p. 360; cf. next abstract] comparisons were made of the effects of external atmosphere control by gas storage and internal atmosphere control by skin coatings in refrigerated storage.

With Jonathan apples storage in 5 per cent. carbon dioxide and 16 per cent. oxygen doubled the storage life, whereas the most effective skin coating, 8 to 10 per cent. C.O.S. [loc. cit.], increased it by only half [cf. 23, p. 303]. Gas storage controlled Jonathan spot but coating did so only partially, and fruit from gas storage was much more palatable. That the coating gave only partial control is mainly attributed to the relatively low internal carbon dioxide levels (probably about 3 per cent.); in the gas-stored fruit the figure would have been about 5½ per cent., and unpublished work by the authors indicates that control requires over 3 per cent. in the internal atmosphere. Restriction of normal ripening by the low oxygen levels in coated fruit (approximately 12 per cent. at low temperature and 2 to 3 per cent. after removal from cool storage) would account for its low palatability.

[Unspecified] mould wastage was reduced by both gas storage and C.O.S., but not by wax or oil emulsion coatings. With Delicious, gas storage was somewhat better than skin coatings, but neither was markedly better than air storage. In 1941 [23, p. 303] both scald and breakdown were controlled by coating with C.O.S. but not with wax, whereas in 1944 and 1945 coatings had no effect on breakdown.

With Granny Smith, coatings on the whole gave better results than gas storage owing to greater reduction of superficial scald and better control of senescent scalds. Better results were obtained with coated fruit when wrapped before storage, but even when unwrapped there was less superficial scald in coated fruit in air than in gas-stored fruit in oiled wraps. With culinary and dual purpose varieties, in which flavour is of less importance, skin coating treatment may be as satisfactory as gas storage. More scald was present on gas-stored than on air-stored fruit, the scald on the former increasing also with higher carbon dioxide content of the storage atmosphere. Incidence of internal disorders in gas storage was more or less proportionate to the increase in carbon dioxide and not to the decrease in oxygen.

The effects of coatings on both scald and internal disorders varied with the coating material. A castor-oil coating (which has a high resistance to the diffusion of oxygen and a low resistance to that of carbon dioxide) in many instances controlled scald, and caused no internal disorders or off-flavours. Shellac coatings on the other hand (which have a high resistance to the diffusion of carbon dioxide and also, probably, to that of volatiles) induced scald, internal disorders, and the development of off-flavours. The only coatings which increased scald were those which significantly increased the internal carbon dioxide tension. Lowered internal oxygen tensions did not appear to induce internal disorders and off-flavours until a level of about 2 per cent. was reached. At this level anaerobic respiration becomes excessive and a considerable amount of alcohol accumulates in the tissues. Low temperature breakdown was avoided, even when susceptible varieties were stored at 32° F., by gas storage in atmospheres containing 5 per cent. oxygen and under 0·5 per cent. carbon dioxide.

The most important practical difference between the use of skin coatings and normal gas storage is, probably, that the removal of coated fruit from storage to higher temperatures increases the effect of the coating on the internal atmospheres, while when gas-stored fruit is removed atmospheric control ceases. Fruit removed from gas storage ripens and colours normally, though more slowly than uncoated fruit from air storage, whereas coated fruits removed from cool storage in air remain green and do not pass through a normal senescence. The more effective coatings, C.O.S. and certain oils, have, therefore, given good control of senescent disorders in Granny Smith. Certain coatings caused skin disorders due to the toxic nature of their constituents.

Ryall (A. L.) & Uota (M.). **Effects of sealed polyethylene box liners on the storage life of Watsonville Yellow Newtown Apples.**—*Proc. Amer. Soc. hort. Sci.*, 65, pp. 203–210, 2 graphs, 1955.

At the U[nited] S[tates] Horticultural Field Station, Fresno, California, Yellow Newtown apples [*R.A.M.*, 21, p. 530] from the Pajaro Valley near Watsonville were packed in apple boxes with sealed polyethylene liners (or with paper liners as controls) and stored at 31° and 40° F. for 185 days, after which the atmosphere within each package was analysed and its effect on ripening, internal browning, scald, and [unspecified] decay noted [cf. preceding abstract]. All the apples stored at 31° were affected by internal browning while none of those stored at 40° was seriously affected. Apples stored in sealed 150-gauge (thick) polyethylene liners at 40° remained more green and firm and developed less scald than those stored at the same temperature in 100-gauge film liners or with none at all. Some decay developed in all lots. The use of oiled wraps reduced scald development at 31° but not at 40°.

Fisher (D. V.) & Porritt (S. W.). **Some recent studies in late harvesting and delayed cold storage of Bartlett Pears.**—*Proc. Amer. Soc. hort. Sci.*, 65, pp. 223–230, 2 graphs, 1955.

At the Canada Experimental Station, Summerland, British Columbia, Bartlett pears harvested one and two weeks beyond the date of commercial harvesting ripened satisfactorily and were suitable for eating or canning after being held for six weeks at 31° to 32° F. [*R.A.M.*, 31, p. 243]. Storage life was decreased as the period of cold storage was prolonged, and to a greater degree than by delayed harvesting. Fruit harvested at optimum maturity and delayed for 24 or 72 hours before storage for eight weeks at 31° to 32° ripened with good quality. Pears held at 68° after harvesting at optimum maturity underwent a period during which no softening occurred for three days. Fruit picked beyond this stage, however, softened immediately.

Bovey (R.). **Les maladies à virus des arbres fruitiers. II. Arbres à noyaux.** [Virus diseases of fruit trees. II. Stone fruit trees.]—*Rev. rom. Agric.*, 10, 5, pp. 40–43, 3 figs., 1954.

In this second contribution [*R.A.M.*, 34, p. 598] the author gives brief, popular notes on the symptoms, manner of transmission, economic importance, and control of the chief virus diseases of stone fruit trees in Switzerland.

Pfeffinger disease of cherry [32, p. 490] causes increasingly heavy losses in certain communes near Basel, particularly at Pfeffingen. In French-speaking Switzerland it has been found only once, near Geneva. No variety appears to be resistant. The economic importance of the disease is considerable in localities where cherry growing is one of the chief means of livelihood. In one commune near Basel, in which nearly one quarter of the trees are affected, the disease is spreading so rapidly that some orchards may have to be abandoned.

Peach ring spot virus [cf. 30, p. 276] is very widespread. Peach line-pattern virosis virus [cf. 25, p. 218] is very common in plum trees. Prune [plum] dwarf virus [cf. 24, p. 196; 32, p. 135, *et passim*] is not yet widespread in Switzerland, but constitutes a serious menace to the Fellenberg variety. A few peach trees affected by mosaic [cf. 32, p. 615] have been found in various parts of French-speaking Switzerland and the Ticino.

Of these diseases, only Pfeffinger disease of cherry has been studied for any length of time in Switzerland, and there is no information available at present about the frequency and distribution of the remainder. Of 3,300 trees examined in French-speaking Switzerland in 1953, however, 6 per cent. displayed symptoms of virus

disease. No orchard inspected was altogether free from viruses, and in the one most severely diseased 25 per cent. of the apple trees were affected by proliferations [34, p. 598] and were unproductive.

Stanković (D.), Pavićević (B.), & Bebić (D.). **Neka zapažanja o šarki Šljive na Kajsijama i Šljivama u Timočkoj krajini.** [Some observations on Plum pox disease of Apricots and Plums in the Timok region.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1955*, 27, pp. 45–50, 1 pl. (between pp. 32 and 33), 1955. [English summary.]

Plum pox virus disease [*R.A.M.*, 34, p. 795] is reported on apricots and plums in the Timok region, eastern Serbia, Yugoslavia. Susceptible plum varieties [34, p. 705] include Early (red, domestic), Dinka, Italian prune, Large and Small White plum (both domestic), Early plum, Nectarine, and Turgunja.

Slack (D. A.). **Captan offers promise as a control for brown rot of Peach.** —*Arkans. Fm Res.*, 4, 1 [p. 3], 1955.

In 1953 orchard plots of Burbank Elberta peaches at Clarksville, Arkansas, with a history of brown rot (*Sclerotinia fructicola*) [*R.A.M.*, 34, p. 530] were treated with captan (2 lb. per 100 gals. water), captan plus sulphur paste (2 plus 4 lb.), sulphur paste alone (6 lb.), and wettable sulphur (6 lb.), using an airblast sprayer. A rainfall of 4·24 in. and relatively high humidity favoured brown rot development, and the percentages of infected fruit after storage at 44° F. for 28 days were 19·5, 16, 48, and 55, respectively, for the various treatments, and at room temperature 14·9, 7·9, 30·7 and 23·8. Captan enhanced the coloration of the fruit of some varieties.

The effect of captan on the control of peach scab (*Cladosporium* [*Fusicladium*] *carpophilum*) [33, p. 240] was equal to that of sulphur, but it cannot be used in an alkaline mixture. With lead arsenate or zinc sulphate and lime for the control of bacterial spot [*Xanthomonas pruni*: 34, p. 379] it injured the trees, though it is compatible with zinc oxysulphate.

Gaudineau (M[arguérite]). **Les vergers en hiver. Traitements et surveillance des cryptogames parasites.** [Orchards in winter. Treatment and control of parasitic fungi.]—*Journées fruit. maraîch. Avignon, 1954*, pp. 95–102, 2 figs., 1954.

In this paper, based largely on references, the author describes briefly the history, symptoms, economic importance, and control of various diseases of stone fruits in southern France, with particular reference to winter treatments. Experiments in 1952 on the control of peach leaf curl (*Taphrina deformans*) [*R.A.M.*, 28, p. 406] demonstrated the non-toxicity of 0·2 per cent. captan, 0·06 per cent. dichlone, and 0·5 per cent. ferbam on the varieties Arp Beauty, Carman, Gaillard Girerd, Early Elberta, Aribaud, and J. H. Hale. In 1953, treatment of Charles Ingouff, Incomparable Guilloux, Madeleine, and Précoce de Hale with 0·15 per cent. dichlone, 0·3 captan, 0·5 ferbam, and 0·3 zineb all gave good control, particularly captan and ferbam. Pocket plums [*T. pruni*: cf. 33, p. 240 and next page] were controlled in 1953 on the Ente variety by 300 gm. zineb per hl. in February before bud swell. *Sclerotinia laxa* is the most important disease of apricots in this region [33, pp. 161, 707]. For *S. laxa* on peach and plum and *Coryneum* [*Clasterosporium carpophilum*: 33, p. 161] on stone fruits these treatments kill only a certain percentage of the conidia and early sprays must be supplemented by later ones.

The second part of the paper comprises brief notes on branch cankers, notably *Valsa leucostoma* on peach trees [15, p. 447] and *Diaporthe* [? *perniciosa*: 33, p. 707], *Physalospora cydoniae* [*P. obtusa*: 33, p. 609], and an undetermined canker similar to papery bark [24, p. 153], on apple.

HANSEN (C. J.). **Influence of the rootstock on injury from excess boron in Nonpareil Almond and Elberta Peach.**—*Proc. Amer. Soc. hort. Sci.*, 65, pp. 128–132, 2 figs., 1955.

In pot experiments at the University of California, Davis, much less injury to the leaves and stems from excess boron [*R.A.M.*, 29, p. 265] occurred when almond and peach were grafted on almond roots rather than on peach stocks. Accordingly the former are suggested for almond trees in orchards where excess boron is a problem, but they are unfortunately not entirely satisfactory for peach scions.

DARPOUX (H.), PERROT (A.), & SORCHIA (D.). **Sur une nouvelle méthode d'avertissements contre les tavelures du Pommier et du Poirier.** [On a new method of warning against scab of Apples and Pears.]—*Phytiatrie Phytopharm.*, 3, 1, pp. 15–23, 1 diag., 2 graphs, 1954.

A new method of warning against apple scab [*Venturia inaequalis*] and pear scab (*V. pirina*) based on a knowledge of the life history of the pathogens and of the retention of the fungicide in relation to stages of growth has already been described (*Phytoma*, 43 (1952), pp. 15–18, 1952). Vuittenez's apparatus for studying ascospore emission by mature perithecia [*R.A.M.*, 29, p. 102] has been modified so that the reception of the spores is recorded by a revolving cylinder over 24 hours, the motor being uncoupled automatically as soon as rain begins to fall. The suction pump is fixed and the leaves are rotated on a disk [loc. cit.].

Observations were made at Versailles during 1952 and 1953, using this apparatus, to determine the warning threshold for mature perithecia after which there is a serious danger of primary infection. During both years it appeared that this threshold was reached at an ascospore emission of about 1,000 to 1,500 [per hour: loc. cit.] when the pear tree was between the stages of full bloom and fruit swell.

Lesion counts in both years, in conjunction with fungicide tests in which the materials were applied to Doyenné d'Hiver trees at different growth stages, demonstrated that in spite of fairly wet periods 0·75 per cent. Bordeaux mixture, 0·5 and 0·25 per cent. captan, and 0·4 per cent. zineb gave sufficient protection for a period of at least 15 days when applied from full bloom to petal fall or fruit formation. Lower rates of zineb were less effective, as were sulphur and ferbam. Where branch pustules are present to any great extent the trees must be treated at bud burst or in the early stages of development, further applications being made in accordance with ascospore emission.

GAUDINEAU [MARGUÉRITE]. **Les maladies du Prunier.** [Diseases of the Plum tree.]—*Bull. tech. Ing. Serv. agric.* 91, 3 pp., 1 col. pl., 1954.

Two of the most serious diseases of plums in south-west France are pocket plums [*Taphrina pruni*: see above p. 107] and rust (*Puccinia pruni-spinosae*). The incidence of the former varies according to climatic conditions, and losses may attain 95 per cent. in a favourable year. The teleutospore stage of *P. pruni-spinosae* survives on wild and cultivated anemones [*R.A.M.*, 31, p. 613]. Preliminary experiments in 1952 at Monségur demonstrated the efficiency of zineb in comparison with 1 per cent. Bordeaux mixture for the control of rust. In further experiments zineb at 300 *gm.* per hl. and 1 per cent. Bordeaux were applied with an arborex sprayer on 26th March and 15th May, 1953, to Ente plums grafted on Saint Julien, at Dieulival, Gironde. The first spray was very effective against *T. pruni*: on 9th May both sprayed lots bore only a trace of disease, while the untreated sustained up to 20 per cent. misshapen fruit. The marked superiority of the trees sprayed against rust on 15th May was evident by the beginning of August. On 25th August there was 3 per cent. rust on the leaves of zineb-treated trees and less on those treated with Bordeaux, while nearly all the leaves on the controls were affected and had begun to fall. Another planting at Dieulival sprayed with zineb

in 1952 yielded larger fruit than the untreated and was somewhat further advanced in 1953.

Delmas (H. G.). **Essai de traitement contre le pourridié-agaric du Pêcher.** [Experiment on the control of agaric root rot of Peach trees.]—*Phytiatrie-Phytopharm.*, 3, 2, pp. 79–82, 1954.

Peach trees in orchards in the eastern Pyrenees are attacked by various root rots, notably *Armillariella* [*Armillaria*] *mellea* [cf. *R.A.M.*, 27, p. 244]. In view of its importance an experiment was conducted from 1951–53 to determine the effect of various chemicals on the fungus. In the winter of 1951–52 eight identical tubs were half filled with a light, homogeneous, non-calcareous soil, scattered with an identical number of peach roots attacked by *A. mellea*, and then filled up. On 5th February, 1952, two tubs were treated with 250 gm. per sq. m. carbon disulphide [33, p. 79], two with a 2·5 gm. neutral orthoxyquinoline sulphate dust at 400 gm. per sq. m. worked into the soil, two with a methoxyethylmercury dust (1·5 per cent. mercury) at 100 gm. per sq. m., and two were left untreated. A month later a self-rooted, year-old, Pavie Summer Heath peach tree was planted in each tub.

In the first year the trees in the carbon disulphide treatment lost their leaves during June and July. The others developed normally until the summer when the leaves became silvery and gum exuded profusely from the bud axils and branches. During 1953 the trees in the carbon disulphide treatment grew normally with no sign of disease. All the other trees declined progressively, and all but one were dead on 21st November, their root systems being badly diseased up to the collar; those which received carbon disulphide were perfectly healthy. It is suggested that the initial phytotoxic effect of this treatment may be avoided by delaying planting for at least two months.

Hutton (K. E.) & Morschel (J. R.). **Black heart of Apricots in N.S.W.** *Agric. Gaz. N.S.W.*, 65, 7, pp. 364–367, 2 figs., 1955.

Black heart or *Verticillium* wilt of apricots (*Verticillium dahliae*) [cf. *R.A.M.*, 30, p. 332] was first identified at Griffith, New South Wales, in 1948, and has been prevalent in the Murrumbidgee irrigation area, where it is a major problem, and on the Murray river. In the Murrumbidgee area *V. dahliae* was isolated from tomatoes, okra [*Hibiscus esculentus*], eggplant, and almonds, but not peaches, though the last have been affected elsewhere in Australia. Wherever apricots were affected by black heart incidence could be associated with previous cultivation of tomatoes or potatoes. Apricots should only be grown on apricot rootstock and not on plum, kept well away from tomatoes, and never planted on old tomato or potato soil.

Monk (R. J.). **Boron deficiency symptoms in Raspberries.**—*N.Z.J. Sci. Tech.*, Sect. A, 36, 6, pp. 610–613, 3 figs., 1955.

Most of this information on boron deficiency in raspberries in New Zealand has already been noticed from another source [*R.A.M.*, 34, p. 214].

Fitzpatrick (R. E.), Stace-Smith (R.), & Mellor (F. C.). **Heat inactivation of some Strawberry and Raspberry viruses.**—Abs. in *Proc. Canad. phytopath. Soc.*, 22, p. 13, 1954.

At the Plant Pathology Laboratory, Vancouver, B.C., strawberry plants infected with a mottle, leaf tattering virus, and Cuthbert red raspberries infected with mild mosaic virus [raspberry mosaic virus] were grown at between 95° and 105° F. for nine to 11 days. Among the plants which survived were some apparently freed from virus [cf. *R.A.M.*, 33, p. 541].

Graniti (A.). **La 'lebbra' delle Olive in Sicilia.** ['Leprosy' of Olives in Sicily.]—Reprinted from *Olivicoltura*, 9, 5, pp. 3–7, 1954.

This information concerning the occurrence of *Gloeosporium olivarum* on olive in Sicily has already been noticed from another source [*R.A.M.*, 33, p. 739].

Morettini (I.). **Ricerche sull' anatomia delle foglie delle più note varietà di Olivo toscane in relazione alla loro resistenza al Cicloconium oleaginum.** [Researches on the anatomy of the leaves of the best-known Tuscan varieties of Olive in relation to their resistance to *Cycloconium oleaginum*.]—*Notiz. Malatt. Piante, 1954*, 28 (N.S. 7), pp. 3–11, 4 figs., 1954. [English summary.]

After listing the olive varieties that are highly, moderately, and slightly resistant to *Cycloconium oleaginum* [cf. *R.A.M.*, 28, pp. 465–467; 33, p. 437] in the Province of Florence, and pointing out that similar differences in varietal susceptibility appear to occur in other parts of Italy, the author describes an anatomical study of median transverse sections of the leaves of three varieties in the first class and two in each of the others.

The results showed a correlation between greater resistance to *C. oleaginum* and increasing thickness of the palisade tissue, but no correlation with the thickness of the upper or lower epidermis or the lacunar tissue. As photosynthesis occurs mainly in the palisade tissue resistance may, perhaps, be related to the quantity of carbohydrates that accumulate in the leaf.

Chancogne (Mlle M.) & Viel (G.). **Examen de tests de laboratoire pour l'appréciation des possibilités d'utilisation d'un produit comme fongicide agricole.** [An examination of laboratory tests for assessing the possibilities of using a product as an agricultural fungicide.]—*Phytiatrie-Phytopharm.*, 2, 3, pp. 103–109, 2 graphs, 1953.

Three laboratory tests were necessary for assessing the fungicidal efficiency of three products with a quaternary ammonium base, one to determine the degree of spore inhibition, another the degree of protection to the foliage, and a third for the persistence of fungicidal activity. For the first the authors, working at the Institut National de la Recherche Agronomique, Versailles, employed the McCallan dilution test (*Contr. Boyce Thompson Inst.*, 11, pp. 5–20, 1940) to compare the efficiency of three quaternary compounds with copper sulphate and zineb [?dithane] Z-78 against spore germination by *Plasmopara viticola*. Copper sulphate ranked highest followed by the three compounds and zineb. The second test was based on a method with detached vine leaves, the upper surfaces of which were uniformly treated with a given compound or concentration and the lower surfaces inoculated with a spore suspension 48 hours later, with subsequent incubation for five to nine days. The size and number of the conidiophore patches developing determined the efficiency of the material. Copper sulphate was best, followed by quaternary compound No. 2, and then zineb. Persistence was determined as follows. Vine leaves given equivalent concentrations of fungicide were divided into two lots, one lot being watered with artificial rain equivalent to 10 mm. in two hours, and then dried. Both were inoculated with the same spore suspension of *P. viticola*, and compared with Bordeaux mixture tested similarly. Quaternary ammonium No. 2 failed this test. In a subsequent field experiment against potato blight [*Phytophthora infestans*] all three ammonium compounds were less efficient than Bordeaux mixture, due to lack of persistence.

Hus (P.). **Toepassingen van de vernevelingstechniek.** [Applications of the mist-blowing technique.]—*Meded. LandbHogesch. Gent*, 19, 3, pp. 587–591, 1954.

The use of mist blowers in Dutch orchards [*R.A.M.*, 34, p. 469] offers the following advantages. It reduces both the consumption of plant protectives and the

wages of operators by some 50 per cent. On account of the speed with which a large area can be covered, it is easier to make observations on the critical periods with the mist blower than with ordinary spraying equipment.

An average droplet size of 100 to 150 μ is recommended [cf. 34, p. 163]: with these dimensions the velocity of the mist stream should reach 20 m. per second at a distance of 4 m. from the nozzle and 5 m. per second at one of 15 m.

The rate of row coverage is of great importance. In a comparative trial with four machines at the Institute of Horticultural Technology, Wageningen, the average amounts of [apple] scab [*Venturia inaequalis*] following application at 2 km. per hour were 3·3, 3·9, 5·1 and 6, respectively, while the corresponding figures at 3 km., using the same quantity of liquid, were 6·8, 7·7, 8·2, and 9·4 per cent., as against 99·6 in the untreated plots.

Not all plant protectives are equally well adapted for use with the mist blower, various drawbacks being presented, e.g., by fruit tree carbolineum, oil, and DNC ammonium salts. On the other hand, good results are obtainable with DNC emulsions and the powders and pastes specially prepared for mist-blowing. Most of the fungicides applied against scab are used in the form of suspensions.

RADONI (RICCARDA) & DI CARO (S.). **Valutazione in laboratorio dell'attività anticrittogamica dell'unità di rame in diversi ossicloruri di rame e calcio.** [Laboratory evaluation of the anti-fungal activity of the copper component in various oxychlorides of copper and calcium.]—*Ann. Chim. appl., Roma*, 44, 12, pp. 956–959, 1 graph, 1954. [Received November, 1955.]

The results of laboratory experiments in Italy to determine the anti-fungal activity of a series of oxychlorides containing different proportions of copper and calcium, using the slide technique with conidia of *Alternaria tenuis* [cf. *R.A.M.*, 31, p. 342], demonstrated that the biological value of the copper component varies according to the chemical structure of the compound concerned. In the five compounds tested it diminished as the calcium content was reduced, but there was an increase in anti-fungal activity to a maximum value in a compound of biologically critical molecular structure.

FONTANA (P.) & MARTELLI (R.). **Metodo di determinazione dei sali dell'acido etilen bis ditiocarbammico in prezenza di sali di Rame.** [A method for determining salts of ethylene bisdithiocarbamic acid in the presence of copper salts.]—*Ann. Chim. appl., Roma*, 44, 12, pp. 978–981, 1954. [Received November, 1955.]

In view of the growing importance as fungicides of mixtures of ethylene bisdithiocarbamates and copper oxychlorides and carbonates and the need for a reliable method of analysing these products a method was devised at the Faculty of Agriculture, Catholic University, Piacenza, by which the ethylene bisdithiocarbamic acid was decomposed by ferrocyanic acid and the copper rendered insoluble in the form of copper ferrocyanide. The method has a similar sensitivity to that of Clarke *et al.* (*Analyt. Chem.*, 23, p. 1842, 1951), and requires the same apparatus. A further modification consists in employing a mixture of sulphuric acid and potassium ferrocyanide; used in sufficient quantity the latter blocks all the copper present as copper ferrocyanide.

NYUKSHA (Y. P.). Действие бактерицидного облучения на споры грибов. [The effect of bactericidal irradiation on the spores of fungi.]—Микробиология [*Microbiology, Moscow*], 22, 6, pp. 678–681, 2 graphs, 1953.

The use of ultra-violet irradiation of 2,537 Å (150 to 200 μ watt min. per sq. cm.) reduced by 70 to 80 per cent. the number of viable fungus spores responsible for the destruction of books in the Saltikov-Shchedrin State Public Library, Leningrad,

U.S.S.R. Among the fungi detected in the air were species of *Aspergillus*, *Penicillium* (predominating), and *Sporotrichum*, *Spicaria* [*Paecilomyces*] *elegans*, *Rhizopus nigricans* [*R. stolonifer*], *Mucor plumbeus*, *Torula conglutinata*, and *Stemphylium macrosporoideum* [*Acrospeira macrosporoidea*: cf. *R.A.M.*, 32, p. 583].

Owing to the high resistance of fungal spores irradiation of a magnitude 40 times greater than that used against non sporing bacteria was required to obtain the same results. The most effective treatment lies between 100 and 1,500 μ watt min. per sq. cm.

DI MENNA (MARGARET E.). **A quantitative study of air-borne fungus spores in Dunedin, New Zealand.** *Trans. Brit. mycol. Soc.*, 38, 2, pp. 119–129, 1 graph, 1955.

The air-borne moulds detected in and adjacent to a building in the city area of Dunedin, New Zealand [*R.A.M.*, 32, p. 329; 34, p. 799], were estimated quantitatively by exposing agar plates in a Manning slit sampler between March, 1953, and April, 1954. A total of 2,373 colonies was isolated from 170 cu. ft. of air, similar counts being obtained outdoors and indoors. The lowest, an average of 5·9 colonies per cu. ft., were trapped from August to October and the highest, 25·1, from January to March. *Cladosporium* occurred most frequently, 42·9 per cent., followed by *Penicillium*, 34·2.

Yeast estimates made during the same period, indoors only, showed the average density of viable species to be one or two cells or clumps of cells per 2 cu. ft. of air. Most of the 431 isolates fell into the following major groups: *Debaryomyces* spp. (including the imperfect forms *Torulopsis candida* and *T. famata*), 26·2 per cent.; non-pathogenic *Cryptococcus* spp., 42 per cent.; the *Sporobolomyces-Rhodotorula* group, 18·6 per cent.; and the yeast-like phase of *Cladosporium*, 9·5 per cent. Forty-six per cent. belonged to *Cryptococcus diffluens* (128 isolates) and *D. kloeckeri* (70). None of the yeasts showed a marked seasonal distribution.

Proceedings, 1954. *Trans. Brit. mycol. Soc.*, 38, 2, pp. 169–174, 1955.

The following papers were among those presented at a meeting of the Society in London on 9th January, 1954. Observations on the physiology of *Phytophthora fragariae*, by P[ATRICIA] M. FLEETWOOD WALKER, gave a comparison of the nutritional requirements in liquid culture of this fungus, causing strawberry red core disease, and of *P. cactorum* [*R.A.M.*, 33, p. 312]. *P. fragariae* required more thiamin and grew only on hydrolysed casein and a mixture of amino acids plus calcium as nitrogen sources. Oospore production in pure cultures of *P. fragariae* was secured in experiments by M[ARY] GREGG when artificial membranes were incorporated in the culture media, indicating that contact may act as a stimulus to sexual reproduction in this fungus. Observations by C. C. V. BATTS on infection of wheat by *Ustilago tritici* [34, p. 361] suggested that entry of the fungus into the ovary is by way of the testa rather than the stigma as hitherto believed. In recent observations on the *Botrytis* infection of beans R. LEACH studied the role of *B. fabae* and *B. cinerea* in causing chocolate spot of field [broad] beans [32, p. 491]. *B. fabae* causes conspicuous spots and *B. cinerea* insignificant ones. Sporulation occurs only when the leaves are generally invaded. When the lower leaves become senescent, due to a number of causes, the heavy resultant sporulation accounts for the sudden increase in spotting often observed. Infection of strawberry roots by zoospores of *P. fragariae*, by P[AMELA] M. GOODE [32, p. 633], treats of the author's findings that encystment of zoospores and subsequent infection of roots was confined to the root tip zone of plants examined, but in resistant plants, after penetration of the epidermis, no further development took place. Formation and persistence of water droplets on leaves, by J. M. HIRST [34, p. 56], deals with factors concerning potato leaf infection by spores of *P. infestans*.

Bärner (J.). **Bibliographie der Pflanzenschutzliteratur 1951.** [Bibliography of plant protection literature 1951.]—420 pp., Berlin, Paul Parey, 1955. [English and French introduction, contents, and page headings.]

The previous 22 volumes of this comprehensive annual bibliography produced since 1921 [cf. *R.A.M.*, 2, p. 417; 17, p. 336] contained the international phytopathological literature published in the years 1914–45. The present volume contains over 12,500 titles published in 1951 and is compiled on the usual lines. The missing volumes for 1946–50 will follow in the near future.

Richter (H.). **50 Jahre deutscher Pflanzenschutzdienst.** [Fifty years of the German Plant Protection Service.]—*NachrBl. dtsch. PflSchDienst (Braunschw.), Stuttgart*, 7, 5, pp. 65–96, 2 figs., 2 graphs, 1955.

This issue is dedicated to a review of the history and present state of achievement of the German Plant Protection Service, the introduction being concerned with the preceding 25 years, which led to its organization on an official and national basis.

Other papers deal with individual aspects of plant protection and their development over 50 years. W. Ext (pp. 68–72) discusses the organization and duties of the official plant protection service on a local and regional administrative basis. B. Rademacher (pp. 72–76) discusses the development of academic education in plant pathology and plant protection in Germany. H. Müller (pp. 77–79) gives an account of the development of official testing of plant protectives and their significance for the German Plant Protection Service. A. Winkelmann (pp. 80–82) describes the progress in seed disinfection techniques contributed to by German workers. Nowadays, seed disinfection is usually carried out commercially, and is subject to special legislation. K. Ludewig (pp. 82–87) reviews the progress of legislation in general and in relation to particular pests and diseases, control measures against some of which have been made compulsory. Laws prohibiting the import of certain plants likely to carry pests or diseases are given with comments, and the regulations concerning the sale and application of toxic chemicals are surveyed. K. V. Stolze (pp. 87–92) details the working of the organization concerned with pest and disease surveys [cf. 34, p. 50] as well as relevant meteorological information and the issue of spray warnings. The working of this service is shown in two diagrams, and the kind of information obtained as well as the pests and diseases mostly concerned are listed in detail. A. Härle (pp. 92–96), dealing with the same subject from a different angle, gives the early history of the information service, later developments, and the principles of the organization which are still in force.

Wood (R. K. S.) & Tveit (M.). **Control of plant diseases by use of antagonistic organisms.**—*Bot. Rev.*, 21, 8, pp. 441–492, 1955.

In this review is discussed the isolation and selection of organisms antagonistic to plant pathogens [cf. next abstract], disease control in general, and the control of specific diseases caused by actinomycetes and fungi. A bibliography of 190 titles lists all the reference works of importance.

Pramer (D.). **Antibiotics against plant diseases.**—*Sci. Amer.*, 192, 6, pp. 82–88, 90, 2 figs., 2 graphs, 1955.

This is a useful, semi-popular summary and discussion of recent outstanding advances in the development of plant disease control by antibiotics [cf. *R.A.M.*, 34, p. 801 and preceding abstract]. In a brief introduction to the subject it is stated that more than 2,000,000 lb. chemicals, costing $35,000,000, are expended annually in the United States in the plant protection campaign.

Ark (P. A.). **Streptomycin for plant diseases.**—*Calif. Agric.*, 8, 3, pp. 7–8, 2 figs., 1954.

The activity of streptomycin against *Erwinia amylovora* [*R.A.M.*, 35, p. 25], *Xanthomonas juglandis*, *Corynebacterium michiganense*, *Pseudomonas syringae*, *X. malvacearum*, *X. begoniae*, *Bacterium* [*P.*] *savastanoi*, and *Agrobacterium tumefaciens* examined at the University of California, Berkeley, was more pronounced against the more susceptible Gram-positive species. The action of streptomycin against *E. amylovora* was heightened and against *X. juglandis* [32, p. 704] slightly inhibited in the presence of fermate. Otherwise, none of the standard fungicides used inhibited the activity of streptomycin.

Field seed and seed of cotton, cucumber, and tomato artificially contaminated with *X. malvacearum*, *P. lacrymans* [31, p. 472], and *C. michiganense*, respectively [23, p. 414], were steeped in streptomycin (1 part to 1,000, 5,000, and 10,000 parts distilled water) from 20 minutes to one hour. The seeds were then cultured on potato-dextrose peptone agar; all were found free from bacteria, and subsequently produced healthy plants. To evaluate the potentiality of streptomycin against pear fireblight, unopened and opened flowers of *Pyracantha angustifolia* were sprayed with cultures of *E. amylovora* and then treated with streptomycin and kept under warm, moist conditions. Complete control was achieved.

In field trials bentonite dust containing 240 p.p.m. streptomycin and applied at the rate of 30 lb. per acre gave good protection to pears against fireblight, and the fruit was not russeted [35, p. 26]. Similarly, good control of walnut blight was obtained with two sprays (pre- and post-blossom) of 10 p.p.m. streptomycin sulphate with spreader, and no injury was observed during the growing season.

Ulrich (H. M.). **Der Schutz der Textilien gegen Verrottung und Schimmelbefall. Prüfmethoden (I), (II), (III).** [The protection of textiles against rotting and mould infection. Methods of assay (I), (II), (III).]—*Textil-Praxis*, 10, 2, pp. 187–189; 3, pp. 278–281; 4, pp. 366–370, 1955.

This useful compilation of the widely scattered literature on methods for the assay of protectants against the [unspecified] fungi and bacteria responsible for textile rotting and moulds is interspersed with critical comments based on the author's experience.

Cloth protection. An answer to mildew problems.—*Text. Wkly*, 55, 1413, p. 1143, 1955.

Excellent protection of cloth against [unspecified] fungicidal and bactericidal deterioration during storage is reported to be obtainable by treatment with meltisal (Meldrum, Timperley & Co., Ltd., 11, Kenilworth Road, Sale, Manchester), a fine, white, water-soluble powder, which should preferably be added to the size beck from a solution prepared at the boil. The cost is very low (1*s.* 9*d.* for the recommended concentration of 6 oz. per 100 gals. size mixing), and mill tests have shown that yarns sized with a preparation containing meltisal can be woven at moisture contents up to 8 per cent., thereby ensuring better weaving and higher output.

Thomas (R.). **Some chemically modified celluloses and their resistance to fungal degradation.**—*Text. Res. J.*, 25, 6, pp. 559–562, 1955.

At the Wool Textile Research Laboratory, Commonwealth Scientific and Industrial Research Organization, Melbourne, Australia, unbleached cotton duck was chemically modified by partial oxidation with periodic acid, followed by coupling with various carbonyl reagents. Tested for resistance to degradation by *Memnoniella echinata* [*R.A.M.*, 34, p. 536], some of the treated materials inhibited the growth of the fungus at relatively low degrees of substitution. The most effective substituent was phenylhydrazine, which conferred complete resistance at a degree

of substitution of 0·37 per cent. Cotton thus treated, however, is open to the objection of producing a yellow-tinted fabric and the more serious one of reduction in breaking strength due to oxidation. Some suggestions are made for offsetting these disadvantages.

Reese (E. T.), Cravetz (H.), & Mandels (G. R.). **Activity of fungi on oils.**—*Farlowia*, 4, 4, pp. 409–421, 1955.

Of the 358 fungal isolates tested at the Quartermaster Research and Development Center, Natick, Massachusetts, for their capacity to grow on plasticizers, 95 per cent. were able to utilize coco-nut oil [cf. *R.A.M.*, 34, p. 536], 90 per cent. methyl acetyl ricinoleate, and 60 per cent. dihexyl sebacate. Among the species developing most profusely on coco-nut oil (their mycelial weights after seven days exceeding 60 per cent. of the initial weight of the substratum) were *Aspergillus terreus*, *A. ustus*, *Chaetomium spirale*, and *Cunninghamella bertholletiae*, while the 14 making little or no growth included *Acrostalagmus cinnabarinus* [*Nectria inventa*], *Aspergillus repens* [30, p. 528], *Pholiota adiposa*, *Polyporus sulphureus*, and *Stereum purpureum*.

Grümmer (G.). **Die Beziehungen zwischen dem Eiweißstoffwechsel von Kulturpflanzen und ihrer Anfälligkeit gegen parasitische Pilze.** [The relations between the protein metabolism of cultivated plants and their susceptibility to parasitic fungi.] —*Phytopath. Z.*, 24, 1, pp. 1–42, 26 diags., 1 graph, 1955.

At the Institute for Agrobiology of the Ernst-Moritz-Arndt University, Greifswald, Germany, the leaves of opium poppy plants in the field were inoculated with *Pleospora papaveracea* [*R.A.M.*, 31, p. 257] and those of potato and tomato with *Phytophthora infestans* in order to study the connexion between the protein metabolism of the hosts and their susceptibility to the pathogens. Analyses were made of the protein and chlorophyll contents and of the protein level in relation to the incidence of infection at various stages of plant development.

Previous observations as to the predisposing influence of chlorosis—whether occurring normally in older plants or induced experimentally in young ones by growing the plants in the dark—on susceptibility to *Pleospora papaveracea* were confirmed. In the former case, however, the duration of the susceptible phase persisted longer in extensively branched plants, which matured comparatively slowly, than in the rapidly ripening unbranched ones.

Chlorotic tomato leaves likewise proved to be considerably more susceptible to inoculation with *Phytophthora infestans* than fresh, green foliage. The results of tests on hybrids between the Heinemanns Jubiläum variety and *Solanum pimpinellifolium* demonstrated the enhanced susceptibility of precocious, large-fruited plants as compared with those ripening slowly and producing small fruits. The difference between the two groups is attributed to the earlier and more active onset of protein decomposition in the former than in the latter. Studies on potato leaves of the early Erstling [Duke of York] and late Merkur varieties were undertaken to clarify the problem of the dependence of midsummer outbreaks of blight on the physiological status of the foliage [5, p. 381; 7, p. 113; 32, p. 446]. Observations and analyses showed that infection did not occur until some part of the leaves had become predisposed to the fungus through protein decomposition. However, the susceptible tissue was not always attacked immediately unless weather conditions were propitious, and an outbreak of the disease appears, in fact, to depend on the concurrence of internal and external factors. The cause of the onset of protein decomposition in the leaves (chlorosis) was the inception of tuber formation, which makes heavy demands on foliar metabolism. In July-planted stands this process began at a relatively juvenile stage, leading to a premature reduction in the protein content of the leaves and consequently to an early attack of blight.

A number of references to the literature are cited to illustrate the relationship between the protein metabolism of the hosts and their reactions to rusts (*Puccinia* spp.) and various other fungi.

Research programme. Potatoes.—*Rep. Scot. Soc. Res. Pl. Breed. 1954 (abridg.)*, pp. 16–20, 1954.

In this report [cf. *R.A.M.*, 34. p. 627] it is recorded that in 1953 all 11 of the potato seedlings submitted to the registration trials were resistant to the races of blight [*Phytophthora infestans*: loc. cit.; 34. pp. 56. 808] present in Scotland and some were field-immune from one or more of the viruses A. X. and Y.

Inoculation tests on tobacco in 1953 showed that a strain of virus Y, not readily recognizable on potatoes, was present in certain stocks of seedlings. To prevent further spread all unessential stocks of tubers were destroyed and all material to be grown in 1954 and possibly exposed to infection was tested by sap inoculation on tobacco. As a result of these precautions no seedlings were submitted for inclusion in the registration trials or in other such tests outside the Station.

In the final assessments of field resistance to the leaf-roll and Y viruses there were 21 seedlings more resistant to leaf roll and six more resistant to virus Y than the commercial varieties with which they were compared. One seedling, field-immune from virus Y, was found to be partially infected with severe mosaic disease caused by an unrecorded strain of virus A.

Thirty-two strains of virus X were checked for homogeneity and grouped according to the responses made when inoculated to a series of potato test varieties of the [gene] constitution NxNb. Nxnb, nxNb, and nxnb. A large proportion of the strains recovered from American varieties [35. p. 38] were of the primitive type causing lethal necrosis in the presence of either Nx or Nb. Only one strain of this kind was recovered from British material. Several new strains of the B type were found, one occurring, apparently, by mutation from a primitive strain.

The three commercial stocks of Majestic were again sampled to determine the content of virus X, and it was concluded that (*a*) in isolated and undisturbed stock the rate of increase from a low initial virus content is about twofold annually; (*b*) the roguing of visibly infected plants favours the spread of milder variants of the virus, but has little effect on the total virus content of the stock as a whole; and (*c*) infiltration of virus X from adjacent infected stocks takes place rapidly during ordinary agricultural practice and is probably the usual cause of rapid increases in content of virus X.

The virus causing potato stunt [potato dwarf virus: 33, p. 171] appears to be rapidly inactivated *in vitro*, and attempts to prepare an antiserum and examine the physical properties of the virus were unavailing.

An as yet unidentified virus, probably virus S [34, p. 807], has been detected by serological methods in many potato stocks.

The investigations into field immunity from blight further evidenced the instability of *P. infestans* and demonstrated that the four genes so far identified in *Solanum demissum* [33. p. 251] are insufficient to ensure permanent freedom from the disease. Two isolates of the fungus from Canada [34. p. 808] proved to be new and to fall into the classification scheme of 16 strains previously formulated, leaving only one hypothetical race [loc. cit.]. The Canadian race (1,2,3,4) is able to attack plants carrying genes R_1 R_2 R_3 and R_4, but is unable to cause disease in many forms of *S. demissum*, in which additional genes must be present. It seems probable that if field immunity from the common race of blight were combined with a high degree of field resistance [to the other races], any specialized races that might arise would be unlikely to become serious. Breeding experiments with this end in view are in progress.

Broadbent (L.). **The effects of dates of planting and harvesting Potato crops on virus-disease incidence and yield.**—*Ann. appl. Biol.*, 43, 1, p. 149, 1955.

In 1953 stock seed King Edward tubers were planted at Sutton Bonington at monthly intervals from April to August in randomized plots of 33 plants. One tuber with leaf roll virus was planted per plot, and the trial was near sources of leaf roll and potato virus Y. Half the developing tubers in each planting were lifted after 12 weeks and the remainder after the haulm died. Some of the tubers were used as seed in 1954 when the produce of the latter significantly outyielded that of the former; leaf roll virus caused 70 per cent. loss of yield [cf. *R.A.M.*, 34, p. 539 and next abstract]. The incidence of virus disease was slight in the April, May, and August plantings lifted after 12 weeks and in the August planting lifted after 14 weeks (after the haulm died). The healthiest crop in 1954 came from the April planting lifted after 12 weeks, because few aphids were present during the early months of 1953.

Kennedy (J. S.). **Some physiological aspects of virus degeneration of Potatoes.**—*Ann. appl. Biol.*, 43, 1, pp. 149–151, 1955.

In studies at the A.R.C. Unit of Insect Physiology, Cambridge University, the chain of effects of leaf roll virus infection on growth [cf. preceding abstract] was traced through two seasons in small plantings of Arran Consul potatoes. After a period of near-drought in June and July there was much 'second growth' of tubers in the first year, both as extension growth of already developed tubers and as growth of new ones on their own stolons. Virus inoculation of the foliage, during or after the drought, further stimulated the growth of new tubers but restricted the extension growth of the older ones. Thus, the final number of tubers per plant was increased or unaffected, as compared with the healthy controls, while the weight yield was not greatly diminished. In the next growth-cycle, the sprouts on tubers from the newly infected plants grew faster in store than those on tubers from healthy plants and fell behind only after planting, when the shoots had come through the ground.

The first-year plants grown from May to September fell into a graded series of six lots in respect of severity of the disease, the stimulating effect of the disease on young tuber growth and later on sprout growth rising to a maximum and then falling again, with increasing severity through the series. The plants with secondary leaf roll, at the end of the series, showed only a restricting effect of the disease on tuber and sprout growth. The disease progresses through a changing balance between two quantitative but opposite effects on growth, one stimulatory the other restrictive. Only when the plants failed to produce extra tubers did some symptomless plants fail to appear among the progeny in the next year; and only when the restrictive effect had become completely dominant did any catastrophic loss of weight yield ensue.

When tubers from diseased plants, but with different sprouting histories, were compared as seed in the second year, plants from mature, early-sprouting seed tubers were inferior in all respects to plants from immature, later-sprouting tubers. The proportion of symptomless, full-yielding plants which appeared in the progenies of the foliage-infected mother plants was consistently higher among plants grown from immature seed tubers than among those grown from mature seed.

Bode (O.) & Paul (H. L.). **Elektronenmikroskopische Untersuchungen über Kartoffel-Viren. I. Vermessungen an Teilchen des Kartoffel-X-Virus.** [Electron-microscopic studies on Potato viruses. I. Measurements of particles of Potato virus X.]—*Biochim. biophys. Acta*, 16, 3, pp. 343–345, 2 graphs, 1955. [English and French summaries.]

At the Institute for Virus Research, Brunswick, electron-micrographs [cf. next

abstract] of the exudates containing six different strains of potato virus X, prepared by Johnson's water-pressure method [*R.A.M.*, 32, p. 537], revealed rod-shaped particles with a reasonably uniform length of 500 to 525 mμ.

PAUL (H. L.) & BODE (O.). **Elektronenmikroskopische Untersuchungen über Kartoffelviren. II. Vermessung der Teilchen von drei Stämmen des Rattle-Virus.** [Electron-microscopic studies on Potato viruses. II. Measurement of the particles of three strains of the rattle virus.]—*Phytopath. Z.*, 24, 3, pp. 341–351, 2 figs., 10 graphs, 1955.

Continuing their studies on the electron-microscopy of potato viruses [cf. preceding abstract], the authors measured three strains of the rattle [stem-mottle] virus, i.e., stem-mottle, rattle, and 'thistle' (*Sonchus arvensis*). The first two have already been studied by Van der Want and Rozendaal [*R.A.M.*, 28, p. 87; 35, p. 1]; the third was reported by Köhler [32, p. 612] and a further account is to be published. There were no assured differences between the strains in respect of particle dimensions, all having two peaks of length (at 70 and 180 mμ) and a uniform thickness of 20 mμ.

NORRIS (D. O.). **Development of virus-free stock of Green Mountain Potato by treatment with malachite green.**—*Aust. J. agric. Res.*, 5, 4, pp. 658–663, 1 pl., 1954.

This description of the author's technique for deriving and multiplying an aseptic clone of potato in culture solution, from which a growing tip free from virus X was obtained, is an expanded account of work already noticed from another source [*R.A.M.*, 33, p. 46]. From this one virus X-free plant a virus X-free stock of Green Mountain plants has been obtained. From the experience gained in this work it is considered that the use of modified techniques, mainly the excision of much smaller stem tips, should enable virus-free stocks of other X-saturated potato varieties to be derived.

BAGNALL (R. H.) & BRADLEY (R. H. E.). **Note on a virus latent in Potato plants.** —*Amer. Potato J.*, 32, 7, pp. 252–253, 1955.

Attempts made at the Canada Department of Agriculture, Ottawa, to prepare an antiserum against potato mild interveinal virus [? strain of virus X: *R.A.M.*, 34, p. 55] revealed that potato sap often contains an antigen behaving like a latent virus. Precipitin tests made with blood serum of rabbits demonstrated no difference between the antisera formed after injection with virus-infected or healthy potato sap, and their precipitin reactions with sap from plants of 20 potato varieties were identical. Similar tests with sap from 24 potato plants grown from true seed, however, gave negative results. Twelve of these seedlings were then inoculated with sap from an apparently healthy plant which had given a positive reaction with the two antisera. Thirty-six days later sap from the 24 seedlings was tested with the two antisera and another prepared against potato virus X from tobacco. All the 12 inoculated seedlings, though showing no virus-like symptoms, gave positive reactions to the two former, but were negative to the latter. The uninoculated seedlings gave no reaction with any of the antisera.

It is concluded that a latent virus other than those known to infect potato was present in these plants. A virus of this nature could be responsible for the particles found with the electron microscope in the sap of seedling 41956 [34, p. 245].

BAGNALL (R. H.). **Notes on Potato virus A.**—Abs. in *Proc. Canad. phytopath. Soc.*, 21, p. 11, 1953.

Certain European and American potato varieties grown in New Brunswick are nearly symptomless when infected with potato virus A [*R.A.M.*, 32, p. 143] or

certain strains of potato virus X [33, p. 249] alone, but show distinct mosaic symptoms when infected with both. Stocks of potatoes kept free of virus X may therefore be symptomless carriers of virus A. Thus, it is essential to combine resistance to both viruses in commercial potatoes. Epicure and Craigs Defiance are hypersensitive and therefore field resistant to both, and Canso, Katahdin, and Irish Cobbler are hypersensitive to A. U.S.D.A. seedling 41956 is immune from X, but is an almost symptomless carrier of A.

WEBB (R. E.) & BUCK (R. W.). **A diagnostic host for Potato virus A.**—*Amer. Potato J.*, 32, 7, pp. 248–253, 2 figs., 1955.

Plants of *Solanum demissum* P.I. 175404 [cf. *R.A.M.*, 28, p. 78] inoculated with potato virus A at the Agricultural Research Station, Beltsville, Maryland, developed within three to four days small, bluish-black local lesions, different from those caused by other major potato viruses. The sensitivity of this strain of *S. demissum* renders it especially suitable as an indicator host plant, and as it produces a large number of leaves it is possible to test several seedlings on one indicator plant. In addition, its long, narrow leaves are suited to the rapid inoculation technique developed for virus X [27, p. 580], to which it also reacts characteristically.

DAVIDSON (T. R.). **Tuber graft transmission of Potato leaf roll.**—*Canad. J. agric. Sci.*, 35, 3, pp. 238–241, 1955.

At the Plant Pathology Laboratory, Edmonton, Alberta, 12 to 20 and sometimes 48 per cent. successful transmissions of potato leaf roll virus [*R.A.M.*, 34, p. 805] were obtained by tuber grafting, using Carter's Early Favorite, the best virus source, Netted Gem, and Canus. Core grafts and grafts secured by binding diseased and healthy sets together were equally effective. The highest percentage of transfers in core grafts was obtained by placing the diseased core within ¼ in. of the eye in a healthy tuber. Virus transfer was more successful in grafted tubers stored at 40° F. for 26 than for five days.

PEIKERT (F. W.) & BONDE (R.). **Potato disease and insect control with low-gallonage sprayers.**—*Bull. Me agric. Exp. Sta.* 527, 16 pp., 3 figs., 1954. [Received 1955.]

This pamphlet describes the advantages of low-volume spraying [*R.A.M.*, 34, p. 797] of potatoes and summarizes the information obtained in comparative trials of low- and high-volume machines at the Maine Agricultural Experiment Station, Orono. Two trailer-type, low-pressure machines were used, a Hudson 'Peerless' in 1950–2 and a GP Model Myers Sprayer in 1953, both with eight-row booms and one-cylinder engines. They required about one-fourth as much water as the conventional machine, were more adaptable, and initial and operating costs were lower. Long drop pipes on the spray boom gave good coverage and increased aphid control.

Nabam with 25 per cent. DDT oil emulsion was well adapted to the low volume machines and caused no apparent burning of or damage to the foliage even at a concentration over four times that generally used. Zineb, cuprous oxide, and tribasic copper sulphate were less satisfactory.

Both machines gave complete control of late blight [*Phytophthora infestans*] in 1950, 1952, and 1953, when infection varied from relatively light to heavy and destructive. In 1951, when the disease was very severe, control (97 per cent.) was somewhat below that obtained with high pressure equipment (98·8 per cent.).

In 1950, on a field planted with potatoes in the previous two years there was 26 per cent. defoliation by early blight [*Alternaria solani*] in the plots sprayed with the low volume sprayer as against 22 per cent. with the high pressure and 51 per cent. in the unsprayed.

Terrier (C). **Principes de lutte contre le mildiou de la Pomme de terre.** [The principles of the control of Potato blight.]—*Rev. rom. Agric.*, 10, 5, pp. 37–39, 2 figs., 1954.

The author gives a general account of the principles underlying the control of potato blight (*Phytophthora infestans*) [cf. *R.A.M.*, 33, p. 316 *et passim*], which generally appears in French-speaking Switzerland during the latter part of June. He stresses the importance of timing spray applications in accordance with weather conditions so that they shall immediately precede the release of sporangia. Even in a bad blight year not more than five sprayings should be necessary. After the fifth generation of spores these become so numerous and the foliage is so dense that infection cannot be prevented.

Ventura (E.) & Raucourt (M.). **Action sur le feuillage de quelques fongicides utilisés contre le mildiou de la Pomme de terre. Effets des traitements sur la récolte.** [Action on the foliage of some fungicides used against Potato blight. Effects of treatments on the yield.]—*Phytiatrie-Phytopharm.*, 2, 3, pp. 111–118, 1 graph, 1953.

Conditions favouring the maximum development of potato blight [*Phytophthora infestans*] in the area of Attigny in the Ardennes during 1953 provided an excellent opportunity to test the efficacy of various fungicides [*R.A.M.*, 33, p. 622] in a 7 ha. field of Bintje class A tubers from Brittany, planted at the end of March. Blight first appeared on 27th June and spread rapidly throughout the untreated plots until 20th July when all foliage was dead. The copper compounds were applied at 250 gm. metallic copper per hl. water and the organic fungicides at 200 gm. active ingredient, all with a 'Pulvorex' sprayer at a rate of 1,000 l. per ha. The first spray was applied on 17th June, the second on the 30th, and a final one on 9th July. Although a fourth would normally have been given it was omitted to determine the persistence of the action of the test fungicides. These were finally evaluated by taking counts on the 10th, 15th, and 24th July and the 1st and 5th August of the leaves remaining on 16 random plants, assuming ten leaves to an unaffected plant. The effect on yields was determined when the rapid destruction of the foliage had checked tuber growth in the untreated lots.

A cuprous oxide-based product mixed with petroleum oil gave a degree of protection comparable with that of a Bordeaux mixture containing twice as much elemental copper. Two zineb-based products came between 1 and 2 per cent. Bordeaux in efficiency. On the whole, the three spray applications preserved the potato foliage and protected the harvest by enabling tuber development to continue. Yield increases ranged from 25 to 58 per cent. over the untreated.

Choudhuri (H. C.). **Spray tests for control of Potato blight in the hills of West Bengal.**—*Amer. Potato J.*, 31, 9, pp. 263–272, 8 graphs, 1954.

In spray tests carried out in the Darjeeling Hills, West Bengal, India, for the control of potato blight (*Phytophthora infestans*) [cf. *R.A.M.*, 34, p. 670] in high rainfall conditions where Bordeaux mixture had failed, perenox, dithane, soltosan, and perelan were applied at varying concentrations and at intervals of 6 to 14 days. Perenox and dithane were the most effective; both reduced leaf infection and perenox gave the best increase in yield. The shorter spraying intervals, even with lower concentrations of fungicide (perenox 1·25 lb. in 100 gals. water), were more effective than higher concentrations (5 lb.) at longer intervals.

Hyre (R. A.) & Bonde (R.). **Forecasting late blight of Potato in northern Maine.**—*Amer. Potato J.*, 32, 4, pp. 119–125, 3 graphs, 1955.

A survey of temperature and rainfall data and blight (*Phytophthora infestans*)

records for Maine covering the last 50 years showed that Hyre's modification of Cook's method for forecasting outbreaks of blight [*R.A.M.*, 33, p. 752], used in other States, could have been applied with equal success in northern Maine. Forecasting should now be attempted.

STEVENSON (F. J.), AKELEY (R. V.), & BRASHER (E. P.). **Delus: a new variety of Potato, immune from the common races of the late blight fungus, high in percentage of total solids, and adapted to growing conditions in Delaware.**—*Amer. Potato J.*, 31, 12, pp. 410–413, 1954.

The potato variety Delus, selected from a cross between Mohawk and U.S.D.A. Seedling 96–59, and released jointly by the Horticultural Crops Research Branch of the United States Department of Agriculture and the University of Delaware Agricultural Experiment Station, is resistant to late blight [*Phytophthora infestans*: *R.A.M.*, 34, p. 810] and is less susceptible to scab [*Actinomyces scabies*: 34, p. 743] than the standard varieties, Katahdin and Irish Cobbler, to which it is slightly superior in yield and dry-matter content. It possesses good market and cooking qualities. In Delaware it developed internal browning after six months of storage at temperatures between 34° and 38° F., but kept well at Beltsville, Maryland, where the storage temperature averaged 40°.

CASTRONOVO (A.). **Studies on the inheritance of resistance to Phytophthora infestans in Potatoes.**—*Amer. Potato J.*, 31, 12, pp. 397–403, 1954.

The results are presented of experiments carried out at the Institute of Phytotechnics, Castelar, Argentina, on the association between resistance to potato blight (*Phytophthora infestans*) [see preceding abstract] and yield and tuber characteristics in five selections from complex crosses involving *Solanum demissum* and other wild *Solanum* species, all with several back-crosses to potato. These were selfed, and 499 seedlings were inoculated in the greenhouse with Argentina isolate 167 of *P. infestans* in 1949. All the parent clones, resistant or susceptible, transferred resistance and susceptibility to their descendants in similar proportions.

Reaction was determined on the basis of both amount of infection and type of reaction. Although none of the parents showed the hypersensitive type of reaction, yet sporulation of the fungus was not observed on any. The progenies exhibited a range of reactions from hypersensitivity, classed as resistance, to high susceptibility with profuse sporulation. The results indicated the presence in each parent of a single recessive or partially dominant gene causing a hypersensitive reaction, as well as modifiers or multiple genes for resistance, in varying numbers and combinations. There was no association between resistance and number, mean number, weight, mean weight, or colour of the tubers. It was not possible to fit strain 167 of *P. infestans* into any of the proposed systems of nomenclature [*R.A.M.*, 34, p. 808].

PERIŠIĆ (M.). **Savetovanje stručnjaka za zaštitu bilja povodom pojave Krompirovog raka u NR Sloveniji.** [Consultation of the experts for plant protection following the occurrence of Potato wart in PR of Slovenia.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1955*, 27, pp. 124–125, 1 pl. (between pp. 32 and 33), 1955.

Potato wart (*Synchytrium endobioticum*) [C.M.I. map No. 1] is recorded for the first time in Yugoslavia at Planina, near Jesenice, Slovenia. Plant protection experts from various parts of Yugoslavia met at Ljubljana in October, 1954, and discussed measures to prevent its spread.

DU PLESSIS (S. J.). **Requirements for the importation of Potatoes and seed Potatoes.**—*Fmg in S. Afr.*, 30, 350, pp. 239–242, 1955.

The author recapitulates the regulations pertaining to the importation of table

and seed potatoes in South Africa [*R.A.M.*, 34, p. 52], with particular reference to precautions against wart disease (*Synchytrium endobioticum*) [33, p. 658], and gives notes on the limits allowed for the incidence of scab (*Actinomyces scabies*), black scab (*Rhizoctonia* [*Corticium*] *solani*), powdery scab and related fungi (*Spongospora* spp.), and *Phytophthora infestans*.

AYERS (G. W.) & ROBINSON (D. B.). **An inoculation technique for the study of dry rot of Potatoes.**—*Amer. Potato J.*, 31, 9, pp. 278–281, 2 figs., 1954.

At the Laboratory of Plant Pathology, Charlottetown, Prince Edward Island, Canada, an inoculation technique was developed for the study of potato dry rot, mostly caused in the Island by *Fusarium sambucinum* f. 6 [*Gibberella cyanogena*: *R.A.M.*, 33, p. 557]. Sebago tubers 2- to 3-in. in diameter were washed with water in a rotating drum with rubber-covered bars and spindles, then rinsed to remove any loosely adhering spores. This method was found superior to sterilization with 2 per cent. formalin. The tubers were then wounded in two places with a three-pronged instrument and dipped into a water suspension of soil (100 gm. in 1,500 ml.) or of spores at various concentrations. Infection in at lease one of the three infection courts was counted as a single successful inoculation. Inoculated tubers were stored in jute sacks at 40° to 45° F. With highly concentrated inoculum a period of two months was sufficient to establish the rot, low concentrations necessitating a longer period. The extent of the rot was determined by slicing the tuber at right angles to the line of the wounds at half their depth, each lesion being given a rating of 0 to 6. A 'rot index' percentage based on the combined figures of the number of successful inoculations and the extent of decay may be calculated for comparing varietal resistance. In comparisons of soil infectivity, however, only the percentages of successful inoculations need be recorded.

MCKEE (R. K.). **Host-parasite relationships in the dry-rot disease of Potatoes.**—*Ann. appl. Biol.*, 43, 1, pp. 147–148, 1955.

In further studies at the University of Nottingham School of Agriculture on potato dry rot [*R.A.M.*, 34, p. 394] *Fusarium caeruleum* spores from infected tubers were about half as sensitive to solanin [13, p. 405] as those from agar cultures. The toxicity of purified solanin extracts depended upon their pH; thus, in M/15 phosphate buffer solutions of pH 8·3, 7·6, 6·8, 6·2, and 5·6, the LD 50 values for *F. caeruleum* spores from cultures were, respectively, 0·8, 2, 11, 43, and 630 mg. solanin per 100 ml.

In slices of tissue 800 μ thick, cut parallel to a wounded surface of a potato tuber 0, 2, 4, and 6 days after wounding, the solanin contents (expressed as mg. per 100 gm. fresh weight) were: top slice, 0, 21, 108, 120; second slice, 0, 30, 82, 124; third 0, 4, 28, 46; and fourth, 0, 0, 8, 15. Inhibition of spore germination in sap extracted from the slices and buffered to pH 7·6 was closely related to their solanin content.

The pH of sap from healthy tuber tissues was about 6 and that from dry rot lesions 8. When cultures of *F. caeruleum* and *F. avenaceum* were grown in potato extract, the reaction of the medium changed from pH 6·2 to pH 8·8 in a few days. The concentration of solanin near a wound and the alkalinity developed in infected potato tuber tissues suggest that solanin may play some part in restricting fungal infection. The fact that solanin is concentrated largely in the vacuole in living cells would appear to be of great importance in relation to the contrasting behaviour of *F. caeruleum* and *F. avenaceum* in tuber tissues [34, p. 394].

GARRETT (S. D.). **Microbial ecology of the soil.**—*Trans. Brit. mycol. Soc.*, 38, 1, pp. 1–9, 1 pl., 1955.

In his presidential address the author dealt with soil microbiology as it concerns the mycologist. Referring to the substrate pattern of microbial distribution and starting from the rhizosphere concept [cf. *R.A.M.*, 34, p. 673] he enlarged upon the

difficulty of sampling soils so as to give a true picture of the active micro-organisms present at any given time. He pictured the soil as a three dimensional pattern of substrates, each of which passes through the phases of colonization, exploitation. and exhaustion. Stressing the need for new techniques he pointed out the value of autecological study of individual species of root infecting fungi and concluded by remarking on the necessity for the research worker to view his own field in its relation to other branches of biology.

Parker-Rhodes (A. F.). **Fairy ring kinetics.**—*Trans. Brit. mycol. Soc.*, 38, 1, pp. 59–72, 1 diag., 1 graph, 1955.

The behaviour of a system of fairy rings [*R.A.M.*, 6, p. 679], and especially its condition on attaining a steady state, is studied theoretically with the help of a simple geometrical model. From the properties of this model the proportion of ground occupied by the mycelium is calculated and shown graphically as a function of the growth rate for different values of the reproduction rate. The consequences of interaction between fairy rings of different species and the factors affecting the average lifetime of the rings are also considered. Conclusions are drawn from these relationships regarding the adaptation of larger fungi to life in various habitats. The fact that the ring habit is very inefficient and the communities to which it gives rise very open [cf. 32, p. 687] may promote the evolution of numerous species having almost identical ecological requirements. There was found to be a minimum area in which any species can produce a stable ring system; the possible means by which basidiomycetes can compete successfully in smaller areas are discussed.

Angell (H. R.). **Partial segregation of bacteria and isolation of Pythium from the coarser soil fractions.**—*Aust. J. agric. Res.*, 5, 4, pp. 702–705, 1954.

Details are given of a technique for determining the distribution and numbers of *Pythium* particles in soil [*R.A.M.*, 34, p. 434], as an aid to the control of [unspecified] seedling blight [32, p. 601], the object being to prevent or minimize bacterial contamination of the relatively few *Pythium* thalli that develop on media sown with soil. Soil collected in the Australian Capital Territory was divided into seven fractions by washing through 16- and 60-mesh sieves and allowing the suspension to settle for periods ranging from five minutes to four weeks. Coarser fractions were not allowed to dry out but, like the finer unseparated, suspended material, were kept in water until after the finest colloids had been obtained. Samples of the supernatant liquid remaining after removal of the four-week fraction were plated immediately.

The results obtained demonstrated that most of the fungal population (including *Pythium*) was concentrated in the coarser portion of the soil (fractions 2 to 5), while most of the bacteria were in the colloidal part. After deposition of the colloids for four weeks, a mean of less than one bacterium per ml. of supernatant liquid was plated. Separation of bacteria and fungi facilitated the isolation of *Pythium*. The mean number of *Pythium* isolates in 11 other surface soil samples was 1·7 per mg., use being made of the fraction sedimenting from an aqueous suspension in five minutes. In similar samples of subsoil taken at 12, 18, and 24 in. below the surface, the mean numbers of *Pythium* isolates for 10 plates were 0·4, 0·3, and 0·3 per mg., respectively. The large numbers in the surface soil and the small numbers in the subsoil show how the distribution of *Pythium* favours attack on seedlings.

Saksena (S. B.). **Ecological factors governing the distribution of soil microfungi in some forest soils of Sagar.**—*J. Indian bot. Soc.*, 34, 3, pp. 262–298, 2 graphs, 1 map, 1955.

The area studied, in Madhya Pradesh, India, consisted mainly of black cotton ('regur') and red, lateritic soils on basalt rock, with adjacent Vindhyan sandstones.

Samples taken from depths of 0 to 6, 7 to 12, and 13 to 18 in. were studied by Waksman's dilution plate method.

The number of fungi decreased with depth; moisture content had an important influence on abundance and occurrence. Only *Absidia spinosa*, *Phoma hibernica*, *Aspergillus fumigatus*, *A. niger*, *A. terreus*, *Penicillium nigricans*, *P. funiculosum*, *Paecilomyces varioti*, and *Hormodendrum* [*Cladosporium*] *cladosporioides* were resistant to summer drought on exposed soil.

The amount of organic matter, nitrogen, and exchangeable calcium present were favourable for fungal growth and multiplication, whereas the pH had little influence on abundance, pH values ranging mostly between 7 and 8, the lowest recorded being 6·2.

The combined effect of the dominating edaphic factors was more important in determining occurrence and distribution than any single factor.

Phycomycetes were usually abundant in top soils; water moulds (*Achlya*, *Dictyuchus*, and *Allomyces*) were isolated from habitats where humid conditions allowed conservation of moisture, even in times of drought. *Absidia spinosa* was the commonest of the Mucorales, particularly in mature soils; a new [unnamed] genus was found, but species of *Mucor* were rare. *Rhizopus nigricans* [*R. stolonifer*], *Cunninghamella bertholletiae*, and *C. verticillata* were fairly frequent, but the usually common *Zygorrhynchus* was absent from all soils studied. Only one ascomycete genus (*Chaetomium*) and two of the Sphaeropsidales (*Phoma* and *Sphaeronema*) were found.

Phoma hibernica, *Trichoderma*, *Cephalosporium*, *Penicillium nigricans*, and particularly *Aspergillus* were widespread, *A. niger* being ubiquitous and *A. candidus*, *A. flavus*, and *A. terreus* fairly common. *A. sclerotiorum* was found in grassland soil only. *Fusarium* spp. were common.

P. funiculosum and *A. fumigatus* were confined to poor, heat-exposed soils and might serve as indicators for these; others, like *Gliocladium deliquescens*, *G. roseum* *Aspergillus variecolor*, *Cunninghamella bertholletiae*, and *C. verticillata*, would be indicators for mature and developed soils.

Generally, the number of individual fungi and also the number of different species increased with the maturity of the soil, in conformity with the higher vegetation. Three new genera and three new species were discovered, including *Paecilomyces fusisporus* n.sp., *Monocillium indicum* n. gen. n.sp. [without Latin diagnoses], and two new [unnamed] new species of Moniliaceae.

Agnihothrudu (V.). **State in which fungi occur in the rhizosphere.** — *Naturwissenschaften*, 42, 18, pp. 515–516, 1955.

At the Botany Laboratory, University of Madras, India, adapting McLennan's method [*R.A.M.*, 7, p. 471], the author studied the fungal population of the rhizospheres of 15 crop plants [cf. 33, p. 626], including *Crotalaria juncea*, *Eleusine coracana*, *Hibiscus esculentus*, sesame, eggplant, *Amaranthus gangeticus*, and *Brassica juncea*. Most of the fungi except in the last-named tended to occur in the vegetative rather than in the sporing state, whereas in the soil distant from the roots 70 to 90 per cent. of the colonies were derived from spores. The numbers on desiccated and fresh root samples collected during various stages of growth showed similar fluctuations. There was a high correlation coefficient (+0·9) between the number of spore derived colonies and the total of fungi in association with all the plants examined. Desiccated roots harboured no *Fusarium* spp. or *Neocosmospara vasinfecta* and only 0 to 20 per cent. *Macrophomina phaseoli* [loc. cit.; 34, p. 727].

Fulton (R. W.) & Wade (E. K.). **Digitalis diseases in Wisconsin in 1954.** — *Plant Dis. Reptr*, 39, 3, p. 284, 1955. [Multilithed.]

Every field of *Digitalis lanata* examined in Wisconsin in 1954 was attacked by anthracnose (*Colletotrichum fuscum*) [*R.A.M.*, 31, p. 256] and tobacco mosaic virus

[30, p. 403], the latter sometimes affecting up to 50 per cent. of the plants. This appears to be the first record of the natural occurrence of tobacco mosaic virus on this host.

MAHMUD (K. A.). **Review of literature on Phytophthora foot rot of Pan (Piper betle L.).**—*Bull. bot. Soc. Bengal*, 6, 2, pp. 79–88, 1952.

The etiology, symptoms, and control of *Phytophthora parasitica* var. *piperina* [*R.A.M.*, 28, p. 591] on *Piper betle* are briefly reviewed from the literature, with a bibliography of 71 titles.

REVILLA (V. A.). **New Sugar Cane disease in Peru.**—*Azucar*, 3, 8 [pp. 41–43], 1954. [Abs. in *Sugar, N.Y.*, 50, 9, pp. 56–57, 1955.]

The stunting disease of sugar-cane (*Sclerospora* sp.) already reported from Peru [*R.A.M.*, 32, p. 591] has been found to affect numerous other local Gramineae, including *Panicum barbinodes*, *Echinochloa colonum*, *Setaria verticillata*, sorghum, *Sorghum halepense*, *Eleusine indica*, and *Polypogon interruptus*. On most of these hosts the sporangial state develops more profusely and conspicuously than on sugar-cane, involving serious risks of perpetuation and dissemination in the plantations.

MOSER (M.). **Kleine Kryptogamenflora von Mitteleuropa. Band IIb. Basidiomyceten II. Teil. Die Röhrlinge, Blätter- und Bauchpilze (Agaricales und Gasteromycetales).** [Small cryptogamic flora of central Europe. Volume IIb. Basidiomycetes second part. The Boletaceae, Mushrooms, and Gasteromycetes (Agaricales and Gasteromycetales).]—ix+327 pp., 17 figs., Stuttgart, Gustav Fischer, 1955.

This well-produced manual is a completely revised second edition of the former volume II, which has now become the second of three parts of an expanded volume under the general editorship of H. GAMS. It consists of a key to the identification of central European Agaricales and Gasteromycetales. As far as possible the latest precepts of international nomenclature have been followed and wherever feasible macroscopic criteria have been applied in preference to microscopic and chemical.

GUYOT (A. L.). **Catalogue raisonné des micromycètes de Tunisie. I. Urédinales, I. Genre Puccinia (à l'exclusion des espèces parasites des céréales).** [Annotated catalogue of the microfungi of Tunisia. I. Uredinales, 1. Genus *Puccinia* (excluding the species parasitizing cereals).]—*Ann. Serv. bot. Tunis*, 25 (*1952*), 170 pp., [? 1954. Received 1955].

This volume deals with the genus *Puccinia* in Tunisia [cf. *R.A.M.*, 33, p. 383]. It is prefaced by a brief history of botany and mycology in the country and lists some 147 *Puccinia* spp. (excluding those on cereals), together with varieties, giving descriptions, known hosts, synonyms, and distribution. An index of fungus names, a host index, and a bibliography of 280 references are included.

HIRATSUKA (N.) & SHIMABUKURO (S.). **Uredinales of the Ryukyu Islands. Contributions to the rust-flora of Eastern Asia, VIII.**—*Sci. Bull. Fac. Agric. Univ. Ryukyus* 1, pp. 1–56, 2 pl., 1 map, 1954.

In this further contribution to the rust flora of eastern Asia [cf. *R.A.M.*, 33, p. 261] 56 species, including 3 new ones, are added to the known rusts of the Ryukyu Islands. The rusts recorded on economic crops include *Uromyces appendiculatus* on bean [*Phaseolus vulgaris*: loc. cit.], *U. fabae* on broad bean [C.M.I. map No. 200], *U. vignae* on cowpea and *Dolichos lablab*, *Puccinia allii* on *Allium fistulosum* [*R.A.M.*, 33, p. 261], *P. chrysanthemi* [C.M.I. map No. 117], *P. coronata* on *Lolium*

multiflorum [cf. *R.A.M.*, 32, p. 317], *P. graminis* on wheat and *P. hordei* on barley [30, p. 620], *P. kuehnii* on *Saccharum arundinaceum* [C.M.I. map No. 215], *P. purpurea* on *Sorghum* spp. [No. 212], and *P. sorghi* on maize [No. 279].

SALAM (M. A.) & RAMCHAR (P.). **Additions to our knowledge of the rusts of Hyderabad—I.**—*J. Indian bot. Soc.*, 34, 3, pp. 191–195, 1 pl., 2 figs., 1955.

The 12 rust species, new records for Hyderabad, listed here include one new species and *Cerotelium fici* [*R.A.M.*, 34, p. 549] on living leaves of *Ficus hispida*.

SUBRAMANIAN (C. V.) & RAMAKRISHNAN (K.). **On Discella cedrelae Ramakr. T.S. and K.**—*J. Indian bot. Soc.*, 34, 3, pp. 225–226, 1955.

After a critical re-examination *Discella cedrelae* [*R.A.M.*, 30, p. 195] has been transferred to the genus *Didymochora* as *D. cedrelae* n.comb. on the grounds that the pycnidium is subcuticular.

MATTERS (C. NAN). **Morphological characteristics of 9 isolates of Trametes lilacino-gilva Berk.**—*Progr. Rep. CSIRO For. Prod. Div. Proj. P. 11, Sub-Proj. P. 11–12*, 4, v+11 pp., 3 pl., 5 diags., 1953. [Mimeographed.]

The fourth report of this series [*R.A.M.*, 35, p. 46] describes the cultural characters of nine isolates of *Trametes lilacino-gilva* [16, p. 221] using the methods previously outlined. There were wide variations in texture and microscopic characters of the strains but the cultures fall into two groups with regard to macroscopic features such as colour production and growth vigour, and these may be correlated with their geographical distribution. Group A isolates were from Victoria, while those in Group B were mostly from Western Australia.

BARNETT (H. L.). **Illustrated genera of Imperfect Fungi.**—218 pp., 302 figs., Minneapolis, Burgess Publishing Co., 1955. [Mimeoprinted.]

In this manual, intended primarily for instructional use, 283 of the more common or important genera of the Fungi Imperfecti and 19 conidial phycomycetes are illustrated by line drawings (of which 182 are by the author) accompanied by brief descriptions. There is a key to the genera treated (pp. 3–17), an index, and a list of general references (13 titles).

LACOSTE (L.). **De la morphologie et de la physiologie de Peyronellaea stipae nov. sp.** [On the morphology and physiology of *Peyronellaea stipae* n.sp.]—*C. R. Acad. Sci., Paris*, 240, 13, pp. 818–820, 1955.

Peyronellaea stipae n.sp. [without a Latin diagnosis] was isolated in the form of subepidermal, brown, lenticular pycnidia, 75 to 100 μ in diameter, from dry leaf sheaths of *Stipa tenacissima* in France. The spores, emitted in mucilaginous strands, are hyaline, unicellular, ovoid, and measure 7 to 8 by 3 to 4 μ. In pure culture on carrot and other natural media the fungus produces 'alternarioid' conidia; on sterilized esparto grass these spores are typical of *Alternaria tenuis* sensu Neergaard [*R.A.M.*, 25, p. 579]. Maltose (1 per cent.) was the best source of carbon for abundant pycnidial production. The optimum carbon-nitrogen ratio for conidial development was 50 to 60.

Novedades micológicas I. [Mycological news I.]—*Agricultura téc., Santiago*, 14, 1, p. 70, 1954. [Received November, 1955.]

The six new host or fungus records established for Chile [*R.A.M.*, 34, p. 773] during the past two years include *Peronospora schleideni* [*P. destructor*] collected on onion [C.M.I. map No. 76] in Santiago in December, 1952, and *Erysiphe cichoracearum*, which severely attacked potato leaves at La Serena in January, 1954.

HANSFORD (C. G.). **Australian fungi. New species and revisions. I. The Meliolaceae of Australia.**—*Proc. Linn. Soc. N.S.W.*, 78, 3–4, pp. 51–82, 42 figs., 1953.

Notes are given on 61 species of the Meliolaceae [cf. *R.A.M.*, 34, p. 322 and next abstract] found in Australia, arranged under the host families which are in alphabetical order, and including 24 new species of *Meliola*, three of *Irenina*, and one of *Irenopsis*, and 10 new varieties. *M. diospyricola* n.sp. and *M. diospyri-pentamerae* n.sp. occur on *Diospyros* spp.

YAMAMOTO (W.). **List of the sooty mould fungi collected in Formosa.**—*Sci. Reps. Hyogo Univ. Agric.* (Agric. Ser.), 1, 1, pp. 41–54, 1953. [Received 1955.]

This list of sooty moulds collected in Formosa comprises 111 Meliolaceae [cf. preceding abstract], 20 Capnodiaceae, and 39 Microthyriaceae, arranged alphabetically in families, with the hosts of each species appended. A separate host index is also included.

VENKATARAMANI (K. S.). **Some aspects of the work of the Botanical Section of the Tea Experiment Station.**—*Bull. un. Pl. Ass. S. India* 11, pp. 4–12, 3 graphs, 1953.

Most of the information in this article on red 'rust' of tea (*Cephaleuros parasitica*) [*C. mycoidea*] in South India has already been noticed [*R.A.M.*, 34, p. 66]. Damage is at present small but the disease is potentially serious on young bushes and initial eradication of the disease from such plants is, therefore, suggested. Spraying at the times recommended [loc. cit.] should be done with 1 per cent. Bordeaux mixture or 4 oz. of a 50 per cent. wettable copper fungicide in 10 gals. water.

Cylindrocladium sp., responsible for a root disease of tea [31, p. 461], is stated sometimes to be capable of killing the plant. The organism is known to be soil-borne, surviving under very moist conditions and infecting injured tissues to cause decay of the roots.

In tea seed treatment trials at Devarshola [34, p. 67] germination rates for tillex (1·5 per cent. mercury), fernasan, and agrosan (all at 4 oz. per cwt. seed) were 93, 88, and 89 per cent., respectively, after eight weeks, as against 86 per cent. for the controls. The dressings apparently stimulated the enzyme system of the seed rather than destroying the seed-borne organisms.

DELWICHE (C. C.), NEWMARK (P.), TAKAHASHI (W. N.), & NG (MARY). **The relationship between Tobacco mosaic virus and an accompanying abnormal protein.**—*Biochim. biophys. Acta*, 16, pp. 127–136, 1 diag., 2 graphs, 1955.

In this joint contribution from the Departments of Plant Biochemistry and Plant Pathology and the Virus Laboratory, University of California, Berkeley, are reported experiments in which the rate of assimilation of isotopic ammonium ion into various protein-containing fractions of tobacco mosaic virus-infected leaves was followed. Special attention was paid to an abnormal acid-free protein associated with the disease [*R.A.M.*, 34, p. 264], which sedimented at 80,000 *g.* at pH 4·7; it corresponds to Takahashi and Ishii's protein 'X' [32, p. 593] and is designated P_5. A close correlation in isotope content appears to exist between the precursors of this protein and tobacco mosaic virus. Previous observations on the metabolic stability of the bulk of the virus in the host cell are confirmed. The abnormal protein also appears to be comparatively stable *in vivo*. It is considered highly improbable that P_5 is a degradation product of the virus resulting from the extraction procedure, but it may be derived from fragmentation in the host cell of a specific portion of the total virus. Isotopic ammonium is incorporated more slowly into the nucleic acid than into the protein moiety of tobacco mosaic virus. The high activity of the particulate fractions in the incorporation of labelled nitrogen suggested that they are the sites of virus synthesis.

Gondo (M.). **Further studies on the transpiration of mosaic diseased Tobacco plant.** —*Bull. Fac. Agric. Kagoshima Univ., 1953*, 2, pp. 71–74, 1953. [Japanese, with English summary.]

Further studies on mosaic-diseased tobacco plants [cf. *R.A.M.*, 32, p. 647] revealed no differences between the transpiration rates of healthy and virus-infected plants growing in water culture until a month after inoculation, after which the latter had a lower ratio.

Owen (P. C.). **The respiration of Tobacco leaves in the 20-hour period following inoculation with Tobacco mosaic virus.**—*Ann. appl. Biol.*, 43, 1, pp. 114–121, 3 graphs, 1955.

Studies at Rothamsted Experimental Station demonstrated that the respiration rate of detached tobacco leaves during the 20 hours after inoculation with tobacco mosaic virus [cf. *R.A.M.*, 22, p. 328; 28, p. 208, and next abstract] was higher than that of healthy leaves in the winter and lower in the summer. In winter-grown plants, increasing the light intensity during the period before inoculation decreased the respiration rates after infection; increasing the length of day (by means of fluorescent lights) had no effect. Since the change in respiration rate began within one hour of inoculation, it is unlikely to be associated with the formation of new virus.

Pirie (N. W.). **The fission of Tobacco mosaic virus and some other nucleoproteins by strontium nitrate.**—*Biochem. J.*, 56, 1, pp. 83–86, 1954.

In work at Rothamsted Experimental Station tobacco mosaic virus [cf. *R.A.M.*, 33, pp. 264–265 and preceding abstract] was split into free nucleic acid and denatured protein by stronger than molar solutions of strontium nitrate at laboratory temperatures: other nucleoproteins are less easily split. More intense treatment decomposes nucleic acid.

Smirnova (Mme V. A.). О пригодности Дурмана (**Datura stramonium**) для определения титра Табачной мозаики. [Concerning the suitability of Thorn Apple (*Datura stramonium*) for the determination of the virus titre in Tobacco mosaic.]—Микробиология [*Microbiology, Moscow*], 22, 6, pp. 714–718, 1953.

Experiments at the Institute of Microbiology, U.S.S.R. Academy of Sciences, Moscow, showed *Datura stramonium* to be superior to *Nicotiana glutinosa* under local conditions as an indicator plant for tobacco mosaic virus [cf. *R.A.M.*, 30, p. 198]. The former produces a greater number of necroses, which develop well on its leaves at lowered temperatures, it is more susceptible than *N. glutinosa*, its growth period is also longer, its foliage richer, regeneration of the leaves is considerably quicker, and it is very easy to grow.

Schmelzer (K.). **Zur Kenntnis des Wirtspflanzenkreises des Tabakmauche-Virus.** [A contribution to the knowledge of the host plant range of the Tobacco stem-mottle virus.]—*Naturwissenschaften*, 42, 20, p. 564, 3 figs., 1955.

In further experiments at the Institute for Phytopathology, Aschersleben, Germany, the tobacco [potato] stem-mottle virus [see above, p. 118] was transmitted, using *Cuscuta campestris* as a 'bridge' [*R.A.M.*, 34, p. 679], to 50 out of 100 plant species tested. They represented 41 genera of 21 families and included spinach, aster, *Zinnia elegans*, mustard, beans (*Phaseolus vulgaris*) and broad beans, peas, flax, buckwheat, *Reseda odorata*, *Antirrhinum majus*, *Cyphomandra betacea*, *Nicandra physaloides*, *Petunia hybrida*, *Physalis peruviana*, and pansy.

The symptoms varied widely in the several hosts. For instance, aster leaves developed necroses and marked crinkle, those of *C. betacea* a transient, faint mosaic

with slight blistering, in *Z. elegans* there was a temporary clearing of the youngest leaves, small, whitish local lesions were formed on bean foliage, while *P. peruviana* remained completely symptomless, though systemic infection was demonstrated by repeated tests.

McEvoy (E. T.). **Interaction of sodium and potassium on growth and mineral content of flue-cured Tobacco.**—*Canad. J. agric. Sci.*, 35, 3, pp. 294–299, 2 pl., 1955.

The severity of potassium deficiency symptoms in flue-cured tobacco plants grown in sand culture at the Tobacco Division, Central Experimental Farm, Ottawa, was reduced by the addition of sodium to the nutrient supply (*J. amer. Soc. Agron.*, 37, pp. 821–827, 1945).

Murray (J. S.). **Forest pathology in Eire.**—*J. For. Comm., 1952–4*, 23, pp. 25–28, [? 1955].

Detailed descriptions are given of six areas in the Republic of Ireland visited by the author where the group-dying of Sitka spruce [*Picea sitchensis*: *R.A.M.*, 33, p. 457] appeared to be similar to that in a number of British pole-sized Sitka plantations [cf. next abstract].

Following the visit of Dr. Liese to the country in May, 1939, to investigate the heavy attack of *Phaeocryptopus gaeumanni* on Douglas fir [*Pseudotsuga taxifolia*: 19, p. 177] infected stands were severely thinned. and weeded a year or two later. Subsequent growth of *P. taxifolia* was vigorous and healthy, so that at present *Phaeocryptopus gaeumanni* is a ubiquitous but unimportant parasite.

Twenty-ninth and Thirtieth Annual Reports of the Imperial Forestry Institute, 1952–53, 1953–54.—30 pp., 29 pp., University of Oxford, 1954, 1955.

In the section of the first report [cf. *R.A.M.*, 34, p. 494] dealing with forest pathology (pp. 13–15) data are given on an assessment of cambial injuries involving the dying of bark in long, rather narrow areas at the base of the main stem of Sitka and Norway spruce [*Picea sitchensis* and *P. abies*] in Glentress Forest, Peebleshire. It appeared that these injuries, which occur chiefly at the beginning of the growing season and cause a collapse of the cambial tissue, are non-parasitic. Many of the trees just over 30 years old were beginning to be affected by [unspecified] butt rot, an indication of root die-back which may be associated with the trouble in question. Further cases of this bark necrosis were found on European larch in Coed-y-Brenin, Wales, and on Japanese larch [*Larix leptolepis*] in Allerston Forest, Yorkshire. The injured bark was colonized by various fungi which may extend the injuries.

The need is indicated for closer investigation of the interdependence of root development and soil conditions as affecting the debility and dying of Norway and Sitka spruce [33, p. 190 and preceding abstract]. Poor conditions for root development in shallow, wet, peat soil are responsible for the dying of lodgepole pine [*Pinus contorta* var. *latifolia*]. A small area of Japanese larch on a free-draining soil in south Hampshire exhibited severe collapse of wood due to drought.

In the forest pathology section (pp. 13–15) of the second report bark dying on Douglas fir [*Pseudotsuga taxifolia*] was investigated in Dymock Forest, near Ross-on-Wye, and tentatively associated with water deficiency in the cambial region. The trouble appeared to be similar to that reported on spruce the previous year and to occur in plantations in high canopy and up to 25- to 30-years old.

Shields (I. J.). **Observations on phloem necrosis.**—*Trans. Kans. Acad. Sci.*, 56, 1, pp. 61–62, 1953. [Abs. in *Biol. Abstr.*, 28, 1, p. 207, 1954.]

Elm phloem necrosis [virus: cf. *R.A.M.*, 26, p. 269; 31, p. 228], first observed in

Kansas City in 1944, has now spread as far west as Mitchell County and to the south-eastern border county. During the summer of 1951 it was widespread in eastern Kansas.

Kramer (C. L.). **Distribution of leaf spot of Elm (Taphrina ulmi) in Kansas.**—*Trans. Kans. Acad. Sci.*, 56, 3, pp. 310–312, 2 maps, 1953. [Abs. in *Biol. Abstr.*, 28, 6, p. 1436, 1954.]

Maps show the distribution of *Taphrina ulmi* [cf. *R.A.M.*, 31, p. 354] on *Ulmus rubra* in Kansas. It is less prevalent on *U. americana*, and one collection was made on *U. thomasii*.

Bakshi (B. K.). **Principles of tree disease control with reference to Indian forests.**—*Indian For.*, 81, 10, pp. 653–657, 1955.

In this brief review of the general silvicultural practices applied to the control of tree diseases, under the headings of non-parasitic diseases, the effects of injury, sanitation and hygiene, the problem of alternate hosts of heteroecious tree rusts, soil conditions and disease incidence, pure and mixed stands, and felling age, the author refers particularly to conditions in Indian forests and cites the treatment of individual diseases as examples, many of which have already been noticed in this *Review*.

Stillwell (M. A.). **Progress of decay in decadent Yellow Birch trees.**—*For. Chron.*, 30, 3, pp. 292–298, 1954.

About half of the yellow birch (*Betula lutea*) in New Brunswick and Nova Scotia contains limbs affected by die-back [*R.A.M.*, 33, p. 389; 34, p. 408], about one third of which exhibit decay [cf. next abstract]. The less badly affected trees often recover and even those with more marked die-back may develop new limbs and should not therefore be cut out. *Fomes fomentarius* [21, p. 475; 32, p. 519] is the fungus most commonly found associated with the decay, but its rate of progress is uncertain and varies with the age and size of the tree. Many factors require consideration before deciding to cut out birch stands affected by die-back.

True (R. P.), Tryon (E. H.), & King (J. F.). **Cankers and decays of Birch associated with two Poria species.**—*J. For.*, 53, 6, pp. 412–415, 7 figs., 1955.

Poria laevigata and *P. obliqua* are reported to cause serious decay of yellow birch (*Betula lutea*) [cf. *R.A.M.*, 22, p. 158; 28, p. 553] in the Monongahela National Forest in West Virginia. *P. laevigata* produces bark-covered cankers associated with extensive white rot which renders the timber unmerchantable. *P. obliqua*, also causing white rot, produces sterile, perennial, clinker-like conks on branch stubs, seams, or wounds on the trunks of affected trees. It is often found on small-diameter trees, a single sporophore usually indicating extensive decay.

Peace (T. R.). **Sooty bark disease of Sycamore—a disease in eclipse.**—*Quart. J. For.*, 49, 3, pp. 197–204, 1955.

Surveys of the incidence of sooty bark disease of sycamore (*Cryptostroma corticale*) [*R.A.M.*, 33, p. 58 and next abstract] in the London area and the southern counties of England from 1949 to 1954 indicated that its earlier virulence has decreased so enormously that it is no longer of economic importance. The disease was detected in four localities in Hertfordshire, and near Saffron Walden, Essex.

Moreau (C.) & Moreau (Mireille). **Nouvelles observations sur le dépérissement des Érables.** [New observations on Maple die-back.]—*Bull. Soc. linn. Normandie*, Sér. 9, 7, pp. 66–67, 1954.

Observations on *Cryptostroma corticale* in France by the same authors have been

noted previously [*R.A.M.*, 32, p. 221]. This short account lists further localities where it occurs and states that *Acer pseudoplatanus* is the most susceptible species. *A. platanoides* and *A. campestre* are also affected, and one case was noted on *A. negundo*.

White (Irene G.). **Toxin production by the Oak wilt fungus, Endoconidiophora fagacearum.**—*Amer. J. Bot.*, 42, 8, pp. 759–764, 3 figs., 2 graphs, 1955.

This information concerning toxin production by *Chalara quercina* has already been noticed from an abridged version [*R.A.M.*, 34, p. 114].

Griswold (C. L.) & Neiswander (R. B.). **Insects investigated as possible vectors in Oak wilt disease.**—*Fm Home Res.*, 39, 289, pp. 55, 62, 1 fig., 1954.

This information on insect transmission of oak wilt [*Chalara quercina*: see next abstract] has already been noticed from other sources [*R.A.M.*, 33, p. 188; 34, pp. 191, 192].

Tiffany (Lois H.), Gilman (J. C.), & Murphy (D. R.). **Fungi from birds associated with wilted Oaks in Iowa.**—*Iowa St. Coll. J. Sci.*, 29, 4, pp. 659–706, 11 pl., 1955.

In the course of investigations made by the Iowa Agricultural Experiment Station, Ames, into the dissemination of the oak wilt fungus (*Endoconidiophora fagacearum*) [*Chalara quercina*: *R.A.M.*, 34, p. 556 and preceding abstract], 442 fungal isolates (41 genera) obtained by swabbing the beaks and throats of 306 birds from diseased areas were described. *C. quercina* was not among them.

Walters (C. S.), Zuckerman (B. M.), & Meek (W. L.). **The effect of Oak wilt on the cold-soak treatability of Oak fence posts.**—*J. For.*, 53, 5, pp. 356–358, 1955.

In Urbana, Illinois, red oak (*Quercus rubra*) and black oak (*Q. velutina*) fence posts from healthy trees and from trees that had died in 1952 and 1953 from oak wilt (*Endoconidiophora fagacearum*) [*Chalara quercina*: see preceding abstracts] were air-seasoned and then cold-soaked for 48 hours in a fuel oil-pentachlorophenol solution. The disease was found to reduce solution absorption, probably owing to the presence of tyloses in the sapwood [*R.A.M.*, 33, p. 768]. A longer period of treatment (72 hours) is recommended for posts from affected trees.

Moreau (C.) & Moreau (Mireille). **Un important développement de la forme ascosporée de l'Oidium du Chêne en Normandie en 1952.** [An important development of the ascospore stage of *Oidium* of Oak in Normandy in 1952.]—*Bull. Soc. linn. Normandie*, Sér. 9, 7, pp. 67–68, 1954.

In September, 1952, perithecia of *Microsphaera alphitoides* were noticed on leaves of oak shoots [*R.A.M.*, 32, p. 285] in three different localities in the departments of Sarthe and Orne and at Mont des Avalloirs.

Ferreirinha (M. P.). **Identificação de uma doença de Pinus insignis Dougl. e de Pinus pinaster Sol. ex Ait.** [Identification of a disease of *Pinus insignis* Dougl. and of *Pinus pinaster* Sol. ex Ait.]—*Estud. Inform. Serv. flor. aquíc.* 46, 43 pp., 5 figs., 1955. [English summary. Mimeographed.]

This is a comprehensive study, introduced by a review of 28 contributions to the literature and an elucidation of the taxonomy of the fungus, of the disease of pines (*Pinus insignis* [*P. radiata*] and *P. pinaster*) caused by *Diplodia pinea* [cf. *R.A.M.*, 31, p. 1] in Portugal, the former species being affected on the Sintra mountain range and the latter in the Mafra Game Park. Inoculation experiments on *P. pinea*, *P. canariensis*, and *P. halepensis* gave positive results. The symptoms vary to some extent with the different species but always include such fundamental

characters as die-back, incurving of the tips of the current year's shoots, formation of incipient or well-developed cankers, profuse exudation of resin, which may be of a bluish colour, and reddening of the needles after the death of the tree.

Mycelium was principally present in the collenchyma, resiniferous ducts, medullary rays, pith, and, very rarely, in the tracheids. Only at a very advanced stage do the pycnidia rupture the epidermis.

No control measures have yet been applied in Portugal, but those recommended by workers in other countries [cf. 5, p. 708] include the excision and burning of diseased and dead material, and fungicidal treatment of exposed surfaces. Ornamental trees may be sprayed three or four times with Bordeaux mixture. Hewn timber should be protected against the blue stain caused by *D. pinea* either by immersion in water, by drying, or by chemical treatment.

Neves (C. M. B.). **Nota sôbre a fasciação do Pinheiro bravo (Pinus pinaster Sol. ex Ait.) na Ilha da Madeira.** [Note on the fasciation of the wild Pine (Pinus *pinaster* Sol. ex Ait.) on the Island of Madeira.]—*An. Inst. sup. Agron., Lisboa*, 19 (*1952–1953*), pp. 103–106, 9 figs., [? 1955].

On a visit to Madeira in 1952 the author observed numerous cases of fasciation of unknown origin in wild [cluster] pine (*Pinus pinaster*) stands, mostly between 10 and 15 years old, at elevations ranging from 1,200 to 1,500 m. Two forms were differentiated, one involving complete malformation of the stem, which assumes the shape of a racquet with many short twigs on its upper edge, and the second characterized by a variation in the deformity with some branches of the foregoing type and others smaller or virtually non-existent. The former type nearly always leads to the death of the tree, whereas the latter is not invariably lethal, since one of the less severely affected branches may continue to grow.

Wellington (W. G.). **Pole blight and climate.**—*Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.*, 10, 6, pp. 2–4, 1 graph, 1954.

A climatological survey of parts of British Columbia, Washington, Idaho, and Montana for the years 1930 to 1953 revealed a correlation between areas drier and warmer than the average and the incidence of pole blight of western white pine [*Pinus monticola*: *R.A.M.*, 27, p. 210; 34, p. 413]. It is suggested that pole blight may be induced by adverse climatological conditions alone or that these may predispose the trees to infection by the few organisms responsible for most of the symptoms grouped together as pole blight.

Vaartaja (O.). **Correction of chlorosis in Spruce seedbeds.**—*Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.*, 10, 5, p. 2, 1954.

Chlorosis of white spruce due to severe nitrogen deficiency in forest nurseries in Saskatchewan and Manitoba in 1953 and 1954 was overcome by the addition of nitrogen in quantities related to the density and size of the plants. Shading of beds also resulted in some decrease in the symptoms.

Nordin (V. J.), Blyth (Willma), & Carmichael (Betty). **Dry rot of White Spruce flooring.**—*Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.*, 10, 6, p. 2, 1954.

A brown cubical rot which caused the failure of a seven-year-old white spruce floor in Alberta was attributed primarily to *Trametes serialis* [cf. *R.A.M.*, 32, p. 527]. *Poria monticola* [34, p. 9] was also isolated.

Aoshima (K.) & Hayashi (Y.). **Endoconidiophora coerulescens Münch, causing sap-stain of Yezo Spruce (Picea jezoensis) in Japan.**—*Bull. For. Exp. Sta. Meguro* 81, pp. 19–30, 2 pl., 1 fig., 2 graphs, 1955. [Japanese, with English summary.]

A sap stain of decayed Yezo spruce (*Picea jezoensis*) in virgin forests in the head-

waters of the river Ishikari, Hokkaido, Japan, yielded a culture of *Endoconidiophora* [*Ceratocystis*] *coerulescens* [cf. *R.A.M.*, 34, p. 828] which was shown to be identical with isolates from Europe and North America. *C. coerulescens* grew on test blocks of Yezo spruce and Japanese red pine (*Pinus densiflora*) on a sawdust-rice bran medium at 20° C. and caused them to turn bluish-grey.

WASS (J. G.). **Fomes annosus in East Anglian Pine sample plots.**—*J. For. Comm.*, *1952–4*, 23, pp. 75–81, 1954.

Observations on the occurrence of *Fomes annosus* in Forestry Commission pine sample plots in Norfolk and Suffolk [*R.A.M.*, 30, p. 440] made in 1949 led the author to conclude that the severity of infection depended on (1) availability of stumps, (2) depth of soil over chalk, (3) type of land planted, and (4) pure or mixed stands.

IGMÁNDY (Z.), MILINKÓ (I.), & SZATALA (Ö.). **Investigations and control experiments to combat the damping-off of conifer seedlings.**—*Erdész. Tud. Int. Évk.*, 2 (*1952*), pp. 210–226, 1954. [Abs. in *Hung. agric. Rev.*, 3, 2, pp. 12–13, 1954.]

Investigations in Hungary in 1952 showed damping-off of conifers to be mainly due to *Fusarium* sp., five strains having been isolated. The pathogenicity of *Rhizoctonia* [*Corticium*] *solani* was also established. In greenhouse experiments the most damage from *Fusarium* was recorded at 22° to 24° C. and from *C. solani* at 12° to 14°. The best control is obtained by autumn, winter, and early spring sowing and by covering the seeds with subsoil. Chemical control was not effective.

ZHURAVLEV (I. I.) & SKABICHEVSKAYA (Mme T. P.). Патогенность гриба **Alternaria** в отношении всходов хвойных пород в таежной зоне. [Pathogenicity of the fungus *Alternaria* in relation to seedling conifers in the zone of the vast Siberian forests.]—Микробиология [*Microbiology, Moscow*], 22, 6, pp. 719–722, 1953.

According to data from the Leningrad Control Station of Forest Seeds, U.S.S.R., *Alternaria* spp. [cf. *R.A.M.*, 31, p. 357] are much less pathogenic than *Fusarium* spp. on pine, fir, and larch in the Siberian forest zone. *A. iridicola*, *A. oleracea* [*A. brassicicola*], *A. peponis*, *A. radicina* [*Stemphylium radicinum*], *A. raphani*, *A. tenuis*, and, on cultivated plants, *A. phaseolicola* and *A. humicola* have been detected, all of which are weak parasites, causing death of the seedlings before they reach the soil surface and 20 per cent. seedling deaths under hothouse conditions, though only killing isolated seedlings in the nursery. *A. tenuis* and *A. iridicola* appear to be the most pathogenic, killing up to 10 per cent.

For complete sterilization of seeds infected by these species of *Alternaria* the following treatments are recommended: a 30-minute exposure to 3 per cent. solution of [potassium] permanganate [34, p. 761], 2·5 per cent. sulphuric acid, 1 per cent. acetic acid, or a 60-minute exposure to 0·15 per cent. formalin.

NOHARA (Y.) & ZINNO (Y.). **Researches on the prevention of needle blight of 'Sugi', Cryptomeria japonica D.Don. (III.)**—*Bull. For. Exp. Sta. Meguro* 81, pp. 31–41, 1 fig., 1955. [Japanese, with English summary.]

Effective control of needle blight (*Cercospora cryptomeriae*) [*R.A.M.*, 34, p. 415] of *Cryptomeria japonica* was achieved at various nurseries in Japan in 1953 and 1954 by dusting with basic copper carbonate (Sankyo Dô Hunzai), 'basic copper chlorate' (Sanpur San Bordeaux), and yellow copper oxide during the rainy season, especially when combined with Bordeaux mixture sprays.

SATO (K.). **On the infection by fungi to 'Sugi' seeds sown in soil, and the effects of the seed treatments with organic mercury compounds.**—*Bull. For. Exp. Sta. Meguro* 81, pp. 63–74, 2 pl., 1955. [Japanese, with English summary.]

During winter and spring a number of micro-organisms, including *Fusarium* spp.,

Cladosporium sp., *Botrytis cinerea*, and *Alternaria* sp. were isolated from seeds of sugi [*Cryptomeria japonica*] harvested in Japan during the preceding autumn. The organisms were more frequent on fresh seeds than on those stored for two years, but on the other hand the latter were more severely attacked. Seed treatment with 0·16 per cent. uspulun for four or five hours or with 4 to 5 per cent. ceresan effectively disinfected the seeds. Spring sown seeds were affected by *Fusarium* spp., *Rhizoctonia* [*Corticium*] *solani*, and *Penicillium* spp. Pre-emergence damping-off was prevented most effectively by dusting with ceresan, ruberon, and mercron.

DOMAŃSKI (S.). **Badania nad przyczynami powstawania posuszu w starszych drzewostanach Sosnowych w Wielkopolskim Parku Narodowym w Ludwikowie.** [Investigations on the causes of incidence of dried wood in the older Scots Pine stands in the Great Polish National Park at Ludwikowo.]—*Prace Inst. Badaw. Leśn.* 93, 83 pp., 17 figs., 9 graphs, 1 map, 1953. [Russian and English summaries.]

During investigations carried out from 1945 to 1948 in the Great Polish Park at Ludwikowo, Poland, *Armillaria mellea* [*R.A.M.*, 32, p. 44], *Trametes radiciperda*, and *Cronartium asclepiadeum* [30, p. 87] were found to be chiefly responsible for the desiccation and death of Scots pine stands. The extensive damage caused by *A. mellea* was also probably associated with root infection by *Polyporus tomentosus* var. *circinatus* [*P. circinatus*: cf. 32, p. 44] in 80 to 90 per cent. of the older pines on sandy loam soils and in an alluvial layer in some sandy soils at a depth of 50 to 100 cm., with pH 6 to 6·5. The rate of infection of deep roots with this fungus usually increased with the age of the tree, progress of the disease on older trees being slow and never causing death.

FOSTER (R. E.), THOMAS (G. P.), & BROWNE (J. E.). **A tree decadence classification for mature coniferous stands.**—*For. Chron.*, 29, 4, pp. 359–366, 6 figs., 1953.

Mature coniferous stands may be segregated into easily recognizable classes for purposes of estimating the amount of decay in them, and the authors propose three, namely, dead trees with no green leaves, residual trees having external signs of decay, and suspect trees showing abnormalities that signify decay. Trees in the last group are those with fungal sporophores, frost cracks, scars, dead tops, rotten branches, forked trunks, swollen knots, and mistletoe infections. The classification was originally applied to western hemlock (*Tsuga heterophylla*) in upper British Columbia [*R.A.M.*, 31, p. 215] but has been found reliable for other species and in other areas, though subsequent modification may become necessary. Present data indicate that 28 to 62 per cent. of residual trees may contain measurable volumes of rot, but in one instance 54 per cent. of the suspect trees were free from decay. The classification, however, permits segregation of trees into classes of high and low susceptibility to disease, but the data from one species are not applicable to another in the same area.

SILVERBORG (S. B.). **Northern hardwoods cull manual.**—*Bull. N.Y. Sta. Coll. For.* 31, 45 pp., 20 figs. (4 col.), 1954.

This bulletin deals with the deductions to be made as to the amount of diseased wood in timber trees and its relation to the appearance of the fructifications of the fungi causing decay on the trunk, based on the fellings of approximately 700 trees in the Adirondacks. The symptoms of heart rots and the accompanying fructifications of *Fomes igniarius*, *F. applanatus* [*Ganoderma applanatum*], *F. connatus*, *F. fomentarius*, *Ustulina vulgaris* [*Ustulina deusta*], *Polyporus glomeratus*, *Poria obliqua*, *Nectria galligena*, *Eutypella parasitica*, and *Hypoxylon pruinatum*, are described and illustrated, together with some non-parasitic deformities.

Notes are added on the control of heart rots by the prevention of wounds, the

handling of sprout stands, the reduction of sources of inoculum, and the proper selection of crop trees.

SCHEFFER (T. C.) & JONES (T. W.). **Control of decay in bolts and logs of northern hardwoods during storage.** -*Sta. Pap. Northeast. For. Exp. Sta.* 63, 15 pp., 2 figs., 1953. [Multilithed.]

Cutting and storing of timber in the eastern United States before cold weather sets in causes decay from fungal attack. This can be almost entirely prevented if logs and bolts are stored in fresh water. Continuous spraying with water is still uncertain in its results but warrants further trial. Storage under wet hay gives moderate protection which could probably be increased by use of a fungicide as well.

Protection for a few months can be given by spraying the ends of the logs with fungicides, but for longer periods it is necessary also to coat them with an asphalt preparation. Details are given of materials and methods of application suitable for white and yellow birch and hard and soft maples [*Acer* spp.].

Exclusion of air by submersion or by end coating also prevents the staining of birch logs due to oxidation. It is noted that logs of beech and black oak cannot be protected by end treatment as the bark has little resistance to fungi.

EADES (H. W.) & ALEXANDER (J. B.). **Streaky red heart in Douglas Fir—its significance in relation to incipient decay and strength properties.**—*Bull. For. Br. Can.* 113, 16 pp., 2 col. pl., 1954.

In recent years numerous logs of Douglas fir [*Pseudotsuga taxifolia*] have shown a heartwood condition known as 'streaky red heart', characterized by pink to crimson streaks varying in length but generally following a definite group of annual rings, occurring in any part of the trunk. Extensive research at the Vancouver Laboratory of the Forest Products Laboratories of Canada on logs from 11 different localities demonstrated that the condition is not in itself a sign of decay and is readily distinguished from incipient decay due to fungi. Streaky timber does not differ appreciably in strength from unstreaked timber. In an appendix various discolorations due to fungi and other causes are described.

PECHMANN (H. v.). **Erfahrungen mit der Imprägnierung von Stangenzäunen.** [Experiences with the impregnation of fence poles.]—*Allg. Forstz.*, 9, 51, pp. 565–569, 5 figs., 1 diag., 1954. [Received August, 1955.]

Spruce poles 4·5 to 6 cm. in diameter were impregnated by soaking for 48 hours in UA salts, notably basilite UA special, and stored for two to three weeks. Blocks from these were tested in the laboratories of the German Society for Wood Research against *Polyporus vaporarius* [*Poria vaporaria*: *R.A.M.*, 34, p. 558] and *Coniophora cerebella* [*C. puteana*: 34, p. 119]. In all cases the treatment gave adequate protection. Poles 7 to 8 cm. in diameter given a similar treatment for 24 hours and buried 1 m. deep in gravel and clay were adequately protected for three years, but poles soaked for only 4 hours decayed.

Notes et actualités. La protection chimique du bois contre les xylophages et les champignons. [Notes and current events. The chemical protection of wood against wood-destroying insects and fungi.]—*Bull. agric. Congo belge*, 46, 1, pp. 175–182, 1955. [Flemish summary.]

In this paper, reproduced *in extenso* from *Industr. chim. belge*, 19, 11, [undated], L. VAN HAEREN briefly outlines the fundamental principles of the chemical protection of wood against attack by insects and fungi. He distinguishes between preventive and curative protection and gives the essentials of a good preservative, which should permit the incorporation in the volume of wood to be treated of a dosage equivalent to two or three times the threshold toxicity value and should penetrate uniformly to a depth of 5 mm., if oily, and 7 mm., if an aqueous solution.

VERRALL (A. F.). **Preventing and controlling water-conducting rot in buildings.**—*Occ. Pap. Sth. For. Exp. Sta.* 134, 14 pp., 4 figs., 1954.

The most destructive water-conducting ['dry-rot'] fungus attacking timber in the United States is *Poria incrassata* [*R.A.M.*, 34, p. 189], which though most prevalent in warmer humid coastal regions is present in most States. *Merulius lacrymans* [loc. cit.] is occasionally found in the northern States but is unimportant in the south. A brief survey is given of the structural deficiencies conducive to this type of decay.

KOLLMANN (F.). **Technologie des Holzes und der Holzwerkstoffe. Zweite Auflage. Zweiter Band.** [Technology of wood and wood materials. Second edition. Second volume.]—xvi+1180 pp., 8 pl., 1184 figs., Berlin, Springer-Verlag, 1955. DM. 136.

The opening section [3] of the second volume of this exhaustive, fully tabulated, and copiously documented treatise is concerned with timber preservation. A general introduction to the subject is followed by sections on preparatory treatment of the wood; physical, biological, and constructional measures of preservation; chemical methods of preservation; and the various types of preservatives in current use and their assay by mycological, physical, and chemical techniques.

RENNERFELT (E.). **Träskyddskommitténs fält- och rötkammarförsök med olika träimpregneringsmedel. Redogörelse nr III.** [The Wood Preservation Committee's field and rot-chamber experiments with different wood preservatives. Report No. III.]—*Medd. SkogsforskInst., Stockh.*, 44, 9, 36 pp., 2 figs., 5 graphs, 1955. [English translation.]

Some of the information in this fully tabulated report from the Swedish Forest Research Institute of the experiments continued in 1953 (ten years after the initiation of the project) to determine the relative merits of various wood preservatives against [unspecified] fungal rots has already been noticed from another source [*R.A.M.*, 34, p. 688]. Decay in stakes proceeded more rapidly in arable than in sandy soil, whereas posts rotted to about the same extent in all the plots. All the untreated timber in a mine test was condemned, but the damage sustained by the impregnated material was negligible in the virtual absence of leaching. In a series of double impregnation tests, in which wood already treated with Boliden salt was immersed in different tar oils, the incidence of rotting was uniformly reduced. Höganäs and creosote oils (the former extracted from coal mined by Höganäs-Billesholms AB) conferred an approximately equal degree of protection on the timber.

FJELDDALEN (J.) & RAMSFJELL (T.). **Korte råd mot de viktigste skadeinsekt og soppsykdommer på grønsaker og Poteter.** [Brief guidance against the principal insect pests and fungal diseases of vegetables and Potatoes.]—*Ex Minneliste for Hagedyrkere* [Memorandum for Horticulturists.] (Published by Det Norske Hageselskap Havedyrkningens Venner), pp. 23, 27–29, 1955.

Directions for the control by appropriate cultural methods and chemical treatments of some well-known potato and other vegetable diseases in Norway are concisely indicated.

KOLE (A. P.). **Some observations on the zoospores from the zoosporangia of Plasmodiophora brassicae Woron.**—*Tijdschr. PlZiekt.*, 61, 5, pp. 159–162, 4 figs., 1955. [Dutch summary.]

In studies at the Agricultural College, Wageningen, Holland, to elucidate the mode of development of zoospores from the zoosporangia of *Plasmodiophora brassicae* [cf. *R.A.M.*, 10, p. 3; 24, pp. 43, 484], infected rootlets of cabbage seedlings

grown in heavily contaminated soil were washed and cut in sections 2 to 3 cm. in length. In water preparations made from this material the zoospores began to escape from the zoosporangia after about half-an-hour. The majority of the zoospores were provided with one long ($11 \cdot 8 \pm 0 \cdot 23\,\mu$) and one short ($3 \cdot 4 \pm 0 \cdot 15\,\mu$) flagellum, but sometimes two, three, or even four of each length could be detected in preparations stained by Löffler's method as modified by Couch (*Amer. J. Bot.*, 28, pp. 704–713, 1941). Occasionally zoospores were observed in pairs, connected by a thread.

It is concluded from these observations, which agree with the known facts concerning the closely related *Spongospora subterranea* [*R.A.M.*, 33, p. 556], that compound zoospores arise through the fusion of two or more single ones, possibly representing the inception of a sexual stage in the life-history of the fungus.

Diseases of Cabbages, Cauliflowers and related plants.—*Agric. Gaz. N.S.W.*, 66, 4, pp. 189–195, 9 figs., 1955.

In this popular survey of crucifer crop diseases in New South Wales three bacterial, nine major fungal, one caused by nematodes, and four deficiency disorders are listed, with descriptions of symptoms. Control measures recommended are given [cf. *R.A.M.*, 22, p. 190].

Keyworth (W. G.). **Plant Pathology Report.**—*Rep. nat. Veg. Res. Sta., Warwick*, 5 (*1954*), pp. 58–61, 1955.

J. A. Tomlinson reports that near the water source watercress plants are vigorous and there is little crook root [*Spongospora* sp.: *R.A.M.*, 34, p. 566]. Some factors, therefore, associated with the proximity of fresh water tend to reduce the amount of infection. Experimental examination of such factors as rate of water flow, chemical constitution, and gas content of the water is in progress. In commercial watercress beds the addition of trace elements in the form of glass frits did not observably reduce the disease and there are indications that the iron and phosphate constituents of natural waters (and possibly other minor elements) do not play an important role. The significance of the calcium carbonate content of the water is obscure but re-solution of the precipitate from river water resulting from autoclaving reduced root infection markedly, the compounds responsible presumably being among those precipitated by heat.

Virus-like symptoms observed on commercial watercress [30, p. 353; 31, p. 740] were reproduced in healthy plants by sap inoculation and by *Myzus persicae*. They comprised light green or yellowish spots in the form of a mottle or occasionally mosaic or ring spotting patterns. Mechanical transmissions were also made from infected watercress to tobacco seedlings, which developed necrotic local lesions, and to *Nicotiana glutinosa*, turnip, radish, annual stock (*Matthiola incana* var. *annua*), and cruciferous weeds.

W. G. Keyworth and J. Sheila Howell, continuing their studies on the silvering disease of red beet, have shown it to be caused by a species of *Corynebacterium* and not by a virus [34, p. 566]. The pathogen has been consistently isolated from roots and leaves and has produced typical symptoms on inoculation. Systemic symptoms were produced by inoculation of the tap root. Experiments show the disease to be seed-borne, the percentage of seed infection being probably less than 5, but sufficient to initiate the spread of the disease in the steckling bed. Control seems most likely to be achieved by eliminating seed-borne infection or, if this is not possible, by reducing the subsequent spread in the steckling bed. The disease was readily transmitted from root to root by knife cuts and by feeding rabbits.

Dorothy E. Fisher and J. M. Way state that observations in 1953 showed that *Didymella lycopersici* [33, p. 266] is carried beneath the tomato seed coat; special attention was paid to the possibility of controlling it by heat treatment. Of 50

plants grown from seed taken in 1954 from infected fruits, 42 per cent. developed the disease against 8 per cent. of the controls.

A second series of tests showed that canes may be rid of contamination by immersion in 2 per cent. formalin for 24 hours or by 5 per cent. for 15 minutes and then wrapping in sacks for one week to allow the fumes to continue to act.

Tests on the carry-over of the disease on old infected haulms or fruit dug into the soil in the autumn resulted in heavy infection. 30 per cent. of the plants contracting disease from buried haulms and 54 per cent. from fruit. compared with 2 and 12 per cent., respectively, in the controls. So far, no resistant plants of tomato or *Lycopersicon* spp. have been found.

The most common symptoms of rhubarb viruses [34, p. 73] are ring spots of 2 to 10 mm. diameter, which sometimes coalesce, producing a mottle. A. G. CHANNON suggests that all such ring spots may have a common cause. Other symptoms noted are bright yellow flecks, yellow mosaic, general yellowish chlorosis, and scattered light green patches. At least two viruses, one causing ring spots and the other yellow flecks, can be distinguished by their effects on tobacco and other indicator plants. Studies are in progress to determine the reaction of rhubarb to these viruses and to ascertain whether other viruses exist in this crop.

CESARONI (F.). **Trattamenti anticrittogamici al terreno e concia del seme nella difesa antiparassitaria della Bietola da Zucchero.** [Fungicidal soil treatments and seed dressing in the anti-parasitic defence of Sugar Beet.]—*Notiz. Malatt. Piante, 1954*, 28 (N.S. 7), pp. 64–73, 1954. [French and English summaries.]

In an experiment carried out in the Province of Venetia, Italy, in 1953, treatment of sugar beet seed, mainly against foot rot (*Phoma betae* and *Pythium debaryanum*) [cf. *R.A.M.*, 29, p. 486], with mecurigamma [cf. 35, p. 63] (700 gm. per quintal) was compared with soil treatment with ACT (a dust with thiram base, used at 50 kg. per ha.) and with both treatments together.

The average increase in yields at the first and second liftings in the rows treated with mecurigamma as compared with the untreated was 75·61 and 34·58 per cent., respectively. The corresponding figures for increase in the numbers of healthy beets (i.e., those not so affected by *P. betae* and *Rhizoctonia* [*Corticium*] *solani* as to be unsaleable) over the diseased were 114·7 and 46·96, respectively. Soil treatment with ACT had no appreciable effect on disease control.

SCHEIBE (K.). **Die Verbreitung der infektiösen Rübenblattwanze und ihre Bekämpfung.** [The distribution of the infectious Beet leaf bug and its control.]—*Zucker*, 8, 17, pp. 371–372, 1955.

First observed at the end of the second world war in the region of Germany administered by the Hanover Plant Protection Service, beet crinkle, transmitted by the beet leaf bug *Piesma quadrata* [*Zosmenus quadratus*: *R.A.M.*, 17, p. 642; 31, p. 161], is steadily increasing and in 1954 was detected over an area of 47.976 ha. in 1,284 parishes as compared with 23,500 in 544 in 1951. Severe damage, however, is restricted to a territory east of the route through Hanover, Celle, Uelzen, and Lüchow to the frontier between the two zones of Germany. The former method of strip-trapping has been replaced since 1953 by repeated applications of an insecticidal dust, e.g., E 605 [31, p. 483] or POX, to the borders and one treatment of the entire field, necessitating a very strenuous campaign not only during the main periods of activity in May and July to August, but also in the early spring.

BRANDES (J.) & ZIMMER (K.). **Elektronmikroskopische Untersuchungen über die viröse Vergilbungskrankheit der Rübe (Beet yellows).** [Electron-microscopic studies on the virus yellows disease of the Beet (Beet yellows).]—*Phytopath. Z.*, 24, 2, pp. 211–215, 1 fig., 2 graphs, 1955.

Exudates obtained by Johnson's method [*R.A.M.*, 30, p. 403] from leaves of

Kleinwanzlebener E sugar beet, *Tetragonia expansa*, *T. echinata*, *Chenopodium album*, *C. quinoa*, and *Mesembryanthemum crystallinum* plants inoculated by means of *Myzus persicae* with an isolate of beet yellows virus at the Institute for Agricultural Virus Research, Braunschweig-Gliesmarode, Germany, were examined under the electron microscope [cf. 30, p. 640]. The length of 69·6 per cent. of the particles contained in the preparations ranged from 1,160 to 1,340 mμ, giving a mean value of about 1,250 mμ.

Douglass (J. R.). **Outbreaks of Beet leafhoppers north and east of the permanent breeding areas.**—*Proc. Amer. Soc. Sug. Beet Tech.*, 8, 1, pp. 185–193, 1 map, 1954. [Received 1955.]

Since the severe outbreak of curly top virus of sugar beet [cf. following abstracts] in Kansas in 1953 [*R.A.M.*, 33, p. 459] more attention has been paid to the migrations in north and north-easterly directions of its vector, the leafhopper *Circulifer tenellus* [*Eutettix tenella*], from its permanent breeding areas in New Mexico and western Texas. It is stressed that outbreaks of curly top in areas remote from the breeding-grounds do not imply seasonal repetition, but indicate the ability of a migratory insect sporadically to invade areas which normally possess a climate inimical to its survival.

Giddings (N. J.). **Curly top moves east.**—*Proc. Amer. Soc. Sug. Beet Tech.*, 8, 1, pp. 194–196, 1 fig., 1954. [Received 1955.]

A description is given of damage done by beet curly top virus [cf. preceding and following abstracts] and symptoms found during the severe epidemic in 1953 in areas east of the Rocky Mountains in the United States, where the disease is comparatively rare. It is suggested that growers should cultivate resistant varieties in the view of the possibility of further outbreaks.

Giddings (N. J.). **Relative curly-top resistance of Sugar Beet varieties in the seedling stage.**—*Proc. Amer. Soc. Sug. Beet Tech.*, 8, 1, pp. 197–200, 1 fig., 1954. [Received 1955.]

The important factor in varietal resistance of sugar beet to curly top virus [cf. preceding and following abstracts] is susceptibility or resistance to injury by the virus rather than to infection. In tests conducted by the United States Department of Agriculture, Riverside, California [*R.A.M.*, 34, p. 338], plants of the varieties S.L. 92 Ml and 92, curly top-resistant selections from 22/3, were of outstanding resistance in the cotyledonary and early two-leaf stages to injury from the extremely virulent virus strain 11 [34, p. 12]. Resistance to both infection and injury increased with age in all varieties tested, usually more rapidly in those listed as resistant than in the more susceptible.

Fife (J. M.). **Chromatography as a method of attack on the problem of the chemical nature of resistance of Sugar Beets to curly top.**—*Proc. Amer. Soc. Sug. Beet Tech.*, 8, 1, pp. 207–211, 1 fig., 1954. [Received 1955.]

Studies by paper chromatography carried out at the Field Crop Research Branch, United States Department of Agriculture, Riverside, California, showed striking differences in the relative concentration of certain amino acids in sap from healthy sugar beet leaves and those infected by curly top virus [cf. preceding abstracts], as well as in phloem exudate from healthy and diseased roots.

Young beet plants of a susceptible variety were inoculated with a curly top virus strain causing severe symptoms. Chromatograms of the diseased sap showed a spot of an intensity about ten times that of healthy sap, the high density being due almost entirely to one amino acid, tentatively identified as argenine. On the other hand glutamic acid appeared in higher concentration in healthy sap. An amino acid with an Rf value near that of the cysteine standard, 0·08, is present in

both healthy and diseased leaf sap, and considerably more in phloem exudate of the resistant variety U.S. 75.

Distinct differences were found between phloem exudate chromatogram patterns from roots of resistant and susceptible varieties of sugar beet and from mangolds. Spots at Rf 0·07, slightly below that of standard cysteine present in resistant varieties, were barely detectable in the susceptible S.L. 742 and absent from mangolds. At Rf 0·33, near the standard of tyrosine, spots occurred in the resistant varieties but not in the susceptible ones or mangolds.

Coons (G. H.), Gaskill (J. O.), & Daniels (L. B.). **Results of an experiment in Colorado to appraise effects of virus yellows in Sugar Beet.**—*Proc. Amer. Soc. Sug. Beet Tech.*, 8, 1, pp. 219–224, 1954. [Received 1955.]

The effects of virus yellows [cf. following abstracts] on sugar beet yield and quality were studied in a replicated test at Fort Collins, Colorado [*R.A.M.*, 32, p. 228], in 1953 with local virus strains inoculated by means of aphids (*Myzus persicae*). Plots infected on 16th July showed 92 per cent. infection by 29th September compared with an average of 32 on uninoculated plots and had an average root yield 6·8 per cent. less, while the difference in sucrose percentage was insignificant. If the comparison had been between 100 per cent. diseased and healthy plants, it is estimated that virus yellows would have accounted for a root growth repression of 10 to 15 per cent.

McFarlane (J. S.), Bennett (C. W.), & Costa (A. S.). **Effect of virus yellows on the yield and sucrose percentage of the Sugar Beet at Salinas, California, in 1952.**—*Proc. Amer. Soc. Sug. Beet Tech.*, 8, 1, pp. 215–218, 1954. [Received 1955.]

Further information is given on experiments conducted by the Field Crops Research Branch, United States Department of Agriculture, at Salinas, California, for the control of beet yellows virus [*R.A.M.*, 34, p. 567 and following abstracts]. Sugar beet U.S. 56/2 sprayed with demeton (systox) to control the aphid vector [*Myzus persicae*: loc. cit.] was given four applications from April to early June at the rate of 140 ml. (32 per cent.) per acre, and four more from 13th June to 28th July at 168 ml. Infective aphids moved into the plots from an adjacent planting of overwintered miscellaneous sugar beets, and infection was greatest in those beets closest to the source, being about three times as great in the unsprayed plots as in the sprayed. There was no difference in yield between healthy and yellowed beets, but the sucrose content was 1 per cent. lower for the latter.

In a second experiment with the U.S. 15 variety sown on 4th April six applications of 5 per cent. malathion at a rate of about 45 lb. per acre gave an average of about 3 per cent. yellows compared with about 20 per cent. in the undusted. Yield was reduced by one third and sucrose content by 1 per cent.

The inconsistency of yield reduction in the two experiments needs further investigation.

Bennett (C. W.), Price (C.), & Gillespie (G. E.). **Effect of virus yellows on yield and sucrose content of Sugar Beet in tests at Riverside, California.**—*Proc. Amer. Soc. Sug. Beet Tech.*, 8, 1, pp. 236–240, 1 fig., 1954. [Received 1955.]

The land used for this experiment had been planted with sugar beet alternating with a cover crop and fallow for a number of years, fertility being maintained by artificial fertilizers. Planting took place on 29th April after natural aphid populations (mostly *Myzus persicae*) had sunk to low levels in the area. Rows 50 ft. long were inoculated with virus yellows [see preceding and following abstracts] on 22nd and 23rd June by placing on them aphids which had absorbed a selection of virus strains from severely infected potted beets growing in a greenhouse. All plants including controls were sprayed with an [unspecified] systemic insecticide the day after inoculation and at fortnightly intervals until August.

Tips of the full grown leaves of many inoculated plants began to turn yellow

15 to 20 days after inoculation, intensity increasing for two or three weeks, but no symptoms appeared on the later leaves until they were fully grown. Control plots remained almost entirely green. A count made on 13th October showed that the disease had spread very little from the diseased to the control plots, where infection varied from nil to 4·7 per cent., compared with 57·6 to 94·7 per cent. in the inoculated, with some exceptions on plots where most aphids had probably died before feeding.

Despite wide variations, due probably to lack of uniformity in the soil, the depressing effect of virus yellows was marked. The average reduction in root weight was 39·9 per cent. and in sucrose content 35·8 per cent. Conditions in this test were more rigorous than is usual in the field owing to the use of a highly active strain of virus and the inoculation of plants at an earlier stage than is normal for natural infection to occur.

LACKEY (C. F.). **Histological changes produced by virus yellows in Sugar Beet leaves.**—*Proc. Amer. Soc. Sug. Beet Tech.*, 8, 1, pp. 225–229, 2 figs., 1954. [Received 1955.]

The thickness and brittleness of sugar beet leaves caused by the yellows virus [cf. preceding and following abstracts] are apparently due to an increase in the number of parenchyma cells, leaving little intercellular space. Vein clearing and pimples result from reduction of chlorophyll and hypertrophy of cells adjacent to veins, the increase sometimes causing bulging of overlying tissue; usually the phloem contains a few necrotic cells. Vein etching is caused by the death of surface cells along the veins. Chlorotic or necrotic flecks result from injury to epidermal and adjacent parenchyma cells, and similar spots may be caused by groups of pimples. The production of yellow spots and chlorosis can be explained cytologically only by the fading of chloroplasts in affected cells.

BENNETT (C. W.) & COSTA (A. S.). **Observation and studies of virus yellows of Sugar Beet in California.**—*Proc. Amer. Soc. Sug. Beet Tech.*, 8, 1, pp. 230–235, 1954. [Received 1955.]

This article conveniently summarizes current information on the position of sugar beet yellows virus in California [see preceding abstracts]. The disease has not yet been found in the seed crops in the Hemet or Imperial Valleys. In badly diseased areas the beet field weeds *Chenopodium album* and *C. murale* are infected. The host range, indicated by inoculation tests, includes *Nicotiana clevelandii*, *Plantago erecta*, *Stellaria media* (symptomless), several Amaranthaceae, and many Chenopodiaceae, among them nine *Atriplex* spp., nine *Beta* spp. notably *B. macrocarpa*, which, though symptomless, is even more susceptible than sugar beet, six *Chenopodium* spp., *Cycloloma atriplicifolium* (symptomless), *Monolepis nuttalliana*, *Salsola kali*, and *Sueda fruticosa*. Other symptomless carriers are *A. semibaccata* and *Bassia hyssopifolia*. No seed transmission was detected in over 5,000 beet seedlings or in weeds. Susceptible plants appear to have a high resistance to mechanical inoculation. Aphid transmission has been secured experimentally by *Aphis rumicis* and *Macrosiphum solanifolii* [*M. euphorbiae*], besides *Myzus persicae*, which is responsible for the greatest amount of local spread. Sources of overseasoning are abundant and elimination of the disease is difficult in many areas because beets grow throughout the year.

MCFARLANE (J. S.), BARDIN (R.), & SNYDER (W. C.). **An Alternaria leaf spot of the Sugar Beet.**—*Proc. Amer. Soc. Sug. Beet Tech.*, 8, 1, pp. 241–246, 1 fig., 1954. [Received 1955.]

An unreported disease of inbred lines of sugar beet caused by *Alternaria brassicae* was discovered at Salinas, California, in 1950. The disease first appeared in cold, humid weather on older leaves as dark brown spots measuring 2 to 5 mm. and increasing up to 10 mm. in diameter; on some varieties a reddish coloration occurred

round older spots; petioles also may be attacked. Affected leaves turn yellow and die prematurely. Infection centres, if numerous, may coalesce to destroy all the leaves of a plant. Defoliation occurred in three successive winters.

Wild and cultivated radish were found to be preferred hosts, and susceptible crucifers are thought to carry the pathogen from one season to the next. Though commercial sugar beet varieties are resistant there is potential danger in the existence of genes for susceptibility in some parental stocks used by breeders.

SCHNEIDER (C. L.). **Methods of inoculating Sugar Beets with Aphanomyces cochlioides Drechs.**—*Proc. Amer. Soc. Sug. Beet Tech.*, 8, 1, pp. 247–251, 1954. [Received 1955.]

Co-operative investigations were made by the Field Crops Research Branch, United States Department of Agriculture, and Minnesota Agricultural Experiment Station to select suitable methods of inoculation for differentiating between sugar beet varieties susceptible and resistant to *Aphanomyces cochlioides* [*R.A.M.*, 33, p. 197 and next abstract]. Two methods were satisfactory for the glasshouse, namely burying lengths of string on which the fungus had been cultured between the rows of plants in sand flats, and pouring a zoospore suspension along the rows. The latter proved quicker and simpler as inoculum is readily obtained in the laboratory. The fungus is grown in 250 ml. flasks on a sterile decoction of 5 maize grains in 50 ml. of tap water. After a week the broth is decanted and the flasks with the mycelial mats are half filled with sterile tap water. Zoospore production occurs after 12 to 36 hours at the optimum temperature range of 20° to 25° C.: 100,000 to 200,000 zoospores per 4-in. pot are required to obtain satisfactory differentiation of varieties. Successive crops of zoospores may be obtained by adding more water to the mycelium in the flasks.

For field tests adequate infection was secured only by the use of autoclaved sugar beet seed-clusters, coated with vermiculite and nutrient broth, inoculated with the fungus, and sown in the rows together with the ordinary seed by means of the fertilizer distributor.

In most cases greenhouse and field reactions were similar. Three lines were more resistant than the resistant control Acc. 1177. They were 50B92–13, 50B92–25, and 50C3–17; 14 were equal to it in both tests.

FINK (H. C.) & BUCHHOLTZ (W. F.). **Correlation between Sugar Beet crop losses and greenhouse determinations of soil infestation by Aphanomyces cochlioides.** —*Proc. Amer. Soc. Sug. Beet Tech.*, 8, 1, pp. 252–259, 1 graph, 1954. [Received 1955.]

Intensity of soil infestation by *Aphanomyces cochlioides* [cf. preceding and next abstracts] was determined in 19 sugar beet fields in 1946 and in 24 in 1947 by growing sugar beet seedlings in the greenhouse in soil samples from these fields. The percentage of infected seedlings resulting was taken as the intensity of infestation in the corresponding field. In 1946 the degree of infestation after harvest was found to be positively correlated with the reported crop loss from 'root rot' in each field.

In 1947 soil samples were collected before the beets were planted and the estimated degree of infestation was significantly correlated with actual crop losses, percentages of deformed roots, and total weight of 300 beets harvested in these fields.

These results show that the degree of soil infestation in a particular field can be determined prior to planting, and this may prove to be an insurance against subsequent crop failure.

LYONS (T.), LEACH (L. D.), & HILLS (F. J.). **Field trials with soil row treatment for the control of damping-off of Sugar Beets.**—*Proc. Amer. Soc. Sug. Beet Tech.*, 8, 1, pp. 260–263, 1954. [Received 1955.]

Eight field trials on the effect of soil-row treatments [cf. *R.A.M.*, 33, p. 197] on

the beet variety U.S. 41 were conducted in 1953 in California where damping-off, due principally to *Pythium ultimum*, *P. aphanidermatum*, *Rhizoctonia* [*Corticium*] *solani*, and *Aphanomyces cochlioides*, had occurred previously or where it had destroyed the first planting. An application of captan at a dosage varying from 1·9 to 2·9lb. per acre (20 in. row spacing) in 25 or 50 gals. for one or two nozzles, respectively, was given at sowing. In seven replicated trials 525 seedlings emerged per 100 in. from non-treated and 664 from treated seeds, while in six of these tests 278 seedlings from untreated and 400 from treated seed survived: the figures for one trial with arasan SF were 76, 95, 39, and 51, respectively.

In greenhouse trials with soil from the sites of field experiments 118 seedlings emerged from untreated seed units, the comparable figure from seed treated with 25 gm. suspended phygon per 100 gm. seed was 286; of these, 184 treated and 35 untreated seedlings finally survived.

In three of the field trials treatments significantly increased the number of survivors, while in one they improved emergence. Row treatment effectively controlled severe damping-off in one trial, but failed to do so when the field was replanted, owing, probably, to increased soil temperature and humidity in the later planting, which were favourable to the more serious pathogen *A. cochlioides*.

Water cultures of diseased seedlings from flats of field soil showed the presence of *P. ultimum*, *P. aphanidermatum*, *C. solani*, and *A. cochlioides*.

GASKILL (J. O.). **A comparison of several methods of testing Sugar Beet strains and individual roots for resistance to storage pathogens.**—*Proc. Amer. Soc. Sug. Beet Tech.*, 8, 1, pp. 264–270, 1 fig., 1954. [Received 1955.]

Inoculation methods were studied by the Field Crops Research Branch, United States Department of Agriculture, in co-operation with the Colorado Agricultural Experiment Station and the Beet Sugar Development Foundation, for testing sugar beet strains and individual roots for resistance to storage pathogens. In 1952, about 320 roots each of eight strains were injured uniformly at harvest and stored without inoculation under controlled conditions. After storage the percentage of rotted tissue was determined. Roots from the same plots were inoculated in four different ways, using five fungus cultures representing *Botrytis cinerea* (two) [*R.A.M.*, 33, p. 199], *Phoma betae* (two) [loc. cit.], and *Penicillium* sp. [32, p. 414], all isolated from storage rots. In 14 trials, each involving one fungus culture, one method of inoculation, and 16 roots (32 inoculations) for each strain, the amount of rot was determined by measurement after 25 to 42 days' storage at 45° F. and between 97 and 100 per cent. relative humidity.

There were significant differences in percentage of rotted tissue between beet strains in the uninoculated samples, as shown by an F value for strains in excess of 1 per cent.

Inoculation by the agar method [33, p. 199] or the toothpick-spore suspension method, taking 16 roots per strain, was nearly as effective as using samples of 320 uninoculated roots for showing significant differences between the strains. The average rates of rotting by *B. cinerea* in these two methods agreed well with the averages obtained from uninoculated samples. *Phoma betae* data, however, were not in close agreement.

Strain 2, selected for storage rot resistance from U.S. 226, was much superior to the parental variety in resistance to *B. cinerea*, but not in reaction to *P. betae*. These results indicate that successful selection for resistance to *B. cinerea* does not necessarily confer improved resistance to *P. betae*.

Comparable inoculations performed in December, 1952, and in the following March, using *B. cinerea* and *P. betae*, disclosed a loss in resistance to each fungus during the intervening period despite satisfactory storage conditions.

Walters (G. E.). **Seed treating machinery.**—*Proc. Amer. Soc. Sug. Beet Tech.*, 8, 1, pp. 372–375, 1 fig., 1954. [Received 1955.]

This article refers to the disadvantages of the Calkins dry treater, with which sugar beet seed has been treated in the past, and describes three new machines in use with the Great Western Sugar Company during the past three years: the Clute wet treater, the Gustafson slurry treater, and the Kromer treater for both dry and wet methods. Advantages and disadvantages of each machine are discussed in detail [cf. *R.A.M.*, 29, p. 268].

De Fluiter (H. J.) & Hubbeling (N.). **Waarnemingen over topvergeling bij Erwten.** [Observations on top yellows of Peas.]—*Tijdschr. PlZiekt.*, 61, 5, pp. 165–175, 4 figs., 1955. [English summary.]

Following a survey of the literature on top yellows (leaf roll virus) of peas [*R.A.M.*, 35, p. 64], an account is given of the occurrence of the virosis in Holland and its control by the use of resistant varieties [34, p. 695]. Information is then presented on the results of transmission experiments with the aphids *Acyrthosiphon pisum* and *Macrosiphum euphorbiae*. The former species, collected on diseased peas, broad beans, lucerne, and white clover, conveyed the virus to healthy peas of the susceptible Unica variety and to broad beans after a minimum feeding period of a week. Typical symptoms of phloem necrosis were observed in the infected plants. In the tests with *M. euphorbiae* high transmission rates were obtained after feeding periods of one day or longer.

Lucerne was shown by field observations and laboratory experiments to be an important winter host of the virus and of *A. pisum*, alatae of which transmit infection from lucerne to pea fields in the early summer. Within the pea crop itself the virus is disseminated by apterous aphids.

Kendrick (J. B.) & Allard (R. W.). **Lima Bean tolerant to stem rot.**—*Calif. Agric.*, 9, 10, pp. 8, 15, 2 figs., 1955.

Basal stem rot (*Rhizoctonia* [*Corticium*] *solani*) of Lima bean [*Phaseolus lunatus*: *R.A.M.*, 32, p. 416] in California is most severe during the four weeks after emergence. On the hypocotyls brick-red, oval, sunken lesions with concentric rings develop, later enlarging and girdling the stem. Though lateral roots are little affected diseased plants are often stunted, especially under water stress. Severely infected seedlings may die, resulting in 10 per cent. loss or more. After maturity, however, the disease decreases and surviving plants may recover almost entirely.

A trial in 1952 under conditions favouring the disease included 42 lines of the strain L-4, similar to Giant Calico. These were tested against Concentrated Fordhook and the somewhat tolerant Ventura, the two predominating Lima beans in southern California. Five of these lines, all of which were more tolerant than the standards, showed only superficial hypocotyl discoloration and it now remains to transfer this tolerance to commercial varieties.

Pires (J. A.). **A Botrytis root rot of Lettuce.**—Abs. in *Proc. Canad. phytopath. Soc.*, 22, p. 16, 1954.

Experimental inoculations at the Ontario Agricultural College, Guelph, have proved the pathogenicity of a *Botrytis* of the *cinerea* type isolated from rotted lettuce roots [*R.A.M.*, 33, p. 333]. Other *Botrytis* isolates of the *cinerea* type from lettuce foliage and other *B.* species were non-pathogenic to the roots. The pathogen enters near newly differentiated root tissue and shows marked action in advance, but does not colonize deeply until the collapse of the cortex occurs. Its aggressiveness depends on the temperature and on the presence of certain other [unspecified] soil fungi.

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